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VOLUME 34 NUMBER 6

JUNE-JULY 1941
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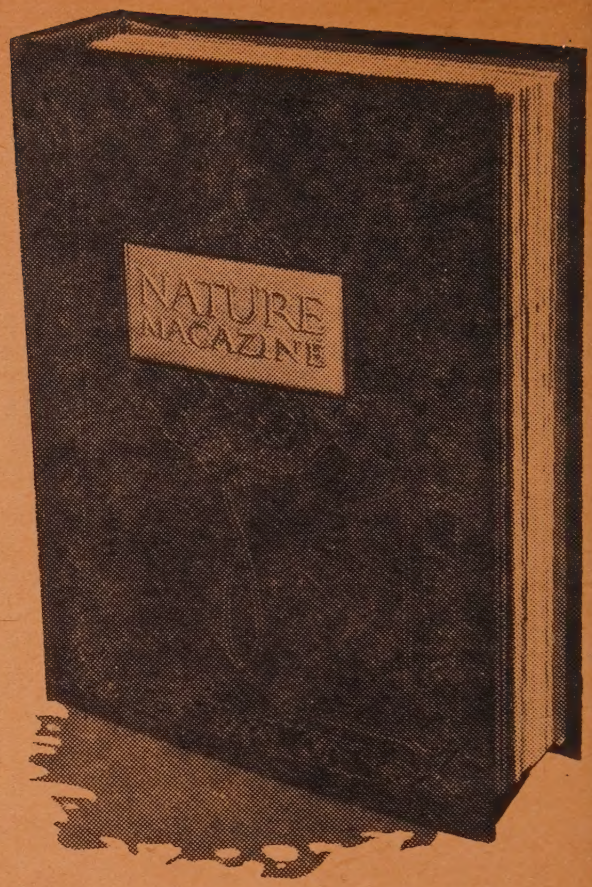

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About the Smokies

Those who have visited and fallen in love with the Great Smoky Mountains will enjoy a little booklet just published by Eva Beard. It is a collection of prose pictures of the region by Miss Beard with drawings by Louis E. Jones. The title is *Within the Smokies*. Copies are available from The Cliff Dwellers, Gatlinburg, Tennessee, at twenty-five cents. Miss Beard is also the author of an attractive booklet entitled *A Calendar of the Catskills*, with prose pictures of the region through the year. This sells for thirty-five cents a copy and is available from the author at Woodstock, New York.

Mexican Summer School

An interesting variety of courses is offered at the Escuela Universitaria de Bellas Artes, San Miguel de Allende, Guanajuata, Mexico, for the summer term July 1 to September 1. Courses are of special interest to those interested in the creative arts. Information may be obtained from Stirling Dickinson, associate director, at the address above.

Hawaiian Birds

Two publications of particular interest to ornithologists come to us from Hawaii National Park. One is a check list of the birds of the Kilauea-Mauna Loa section of the Park, including remarks on the present status of the birds. The other is a discussion of the environmental relationships of the birds in the same section. Both are the work of Paul H. Baldwin, and they are presented in mimeographed form.

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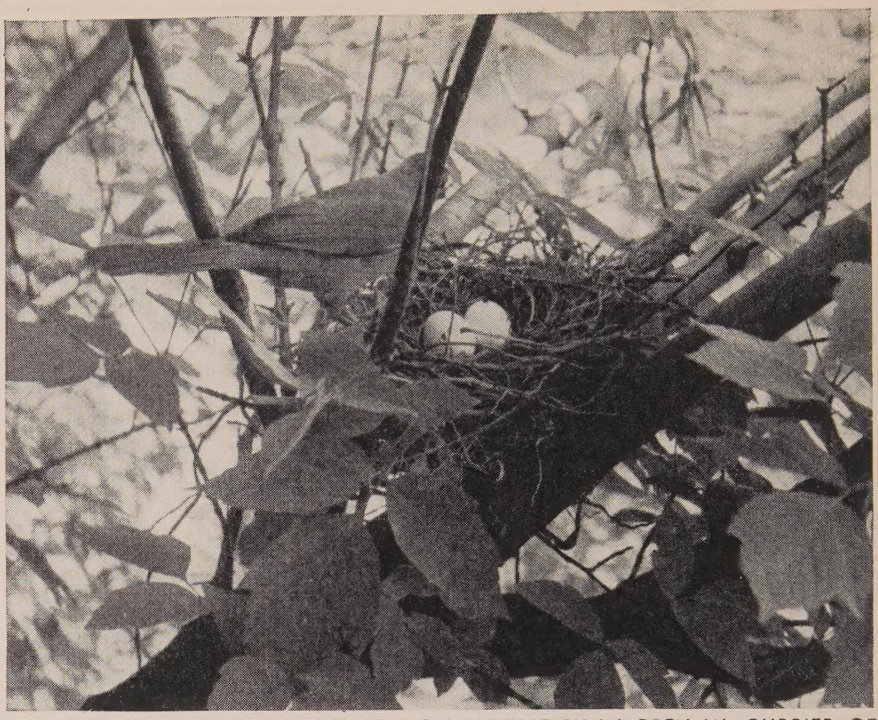
BY NORRIS W. HARKNESS



AT THE NEST—AN HONORABLE MENTION PICTURE BY WARREN W. CURRIER OF STATE COLLEGE, PA., IN OUR 1940 PHOTOGRAPHIC CONTEST

Vacation Equipment

Summer brings vacation trips—unless you are most unlucky—and even worse luck would see you leave without your camera. Your summer crop of pictures will be better if you plan ahead a little. Of course, the kind of trip you have in mind will somewhat control your equipment list, and specializing on certain sorts of pictures would demand an outfit adapted to that work. Usually, however, you will want to shoot landscapes, people, and places as well as Nature subjects. Then, too, most photographers do not have so much extra equipment that the question of what to take is hard to settle, but it is important to have everything that you may need and just as necessary to leave behind the extras that will not be used. Carrying too much is easy early in the day, but it leads to lost pictures and fatigue later on after you have wandered around for eight or ten hours.

So simplify your equipment. You need the camera, meter, a medium yellow filter at least, a sunshade, and extra film and preferably a case large enough to hold all that. A tripod is a good idea, but most shots will not need one and they are a nuisance to carry. However, if you make many pictures of small objects at close range, take the tripod along. The case should have a shoulder strap and be heavy enough to protect the delicate mechanism of the camera and meter from mechanical injury. Filters ought to be in cases that will keep them clean and safe—purses from the ten cent store work well, or you might use the glasses case idea suggested in the following note.

The same considerations apply to movie equipment, except for the tripod. If you make movies you need the steady stand for many shots to avoid the camera wiggle that is so tiring on the screen. You might add fading equipment if you have it. It makes much better films and easier editing if the fader is used both before and after many of the more important shots.

Before you start, go over everything in the outfit and be sure it is in perfect working order. That means that the filters and lenses are clean and that all dust has been blown out of the camera after you loosen it with a small brush. Clean the inside of the case too, and go over everything with the vacuum cleaner to eliminate all the dirt.

If the trip is to be a long one, or you hope to get pictures of unusual subjects that you might not be able to return to in case of failure, it will be a good idea to take along your developing tank and a small quantity of developer and hypo. A changing bag that will let you load the film into the tank anywhere at any time will help too, and do not forget the thermometer and the chamois or viscose sponge to wipe off the surface moisture before drying the films.

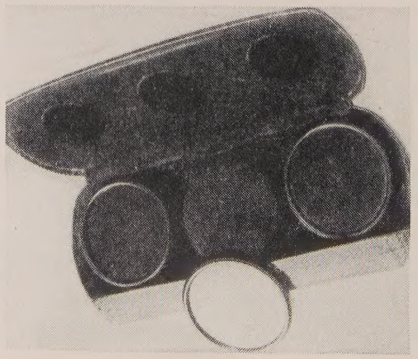
Take your regular developer and the hypo in dry form unless you have a car and portability is not so important. They can be mixed rapidly and the test negatives will be as good as those you process after you get back home if you keep the temperatures constant and work as carefully as you do in your own dark-room. Then, if you find that you have missed a really important shot, you can go back to the scene before you get too far away from it.

But whether you carry along your whole dark-room and all the equipment you own, or just wander with the camera and plenty of hope, may your 1941 vacation pictures be the best ever.

A Filter Case

More and more photographers are carrying two or more filters with them whenever they go picture hunting, and every one of them is having trouble in arranging a convenient way to take them along. In individual cases they either stuff pockets or get lost in the carrying bag, and they always get mixed up just when you need one in a hurry. You try to remember that the red is in the south-east vest pocket and finally find it in the outside left of the coat after the picture chance has gone.

One case for all of them will simplify matters and it ought to cost about twenty cents. Get a spectacle case, the hard kind that will be strong enough to protect the glass. Then glue round cardboard discs a trifle smaller than the diameter of the filter mounts into the deep part of the case. If you cover each one with velvet before you fasten it and make the fit fairly tight, the mounts will hold firmly and there will be no danger of dropping them when the case is open. To make certain that they will not get loose in the case in your pocket, glue strips of the velvet inside the cover to make a thick pad that presses gently on the glass of the filters when the case is closed. The illustration shows how I made mine.



The Problem Corner

Your questions, or at least those of general interest, will hereafter be answered in The Problem Corner. If any photographic problem is bothering you, write to Mr. Harkness for advice.

Miss N. E. S. of Gloucester, Mass., asks: "What is the best way to use my meter when I am making color shots of comparatively small objects?"

ANS.—In the kind of pictures you evidently have in mind, the one central object is the really important thing and the color of its surroundings is less so. The exposure you need, then, is the one that will be right for that one thing, so the meter should be held as close to the central object as is possible without having it or your hand throw a shadow on the area that is reflecting the light to the meter. If your subject is a face or is about that size, the meter should be approximately ten inches away and correspondingly closer for smaller objects. For slightly larger subjects, make a reading on the brightest area and another on the darkest, and then set the exposure half way between the two.

C. L. H., Sarasota, Florida, says: "I have a filter that is deep yellow at one end and color-

less at the other with the color evenly graduated between them. When I put it over my lens, it acts like any other yellow filter and does not affect the sky and foreground differently as I believe it is supposed to do. Can I make it yield 'graduated' results?"

ANS.—When your graduated filter is close to the lens, it acts exactly like a filter whose all-over density is the average of those at the edges of the lens. This is because the light from any part of the scene strikes every part of the lens and each tiny area of the lens contributes its share of the image on the negative, so that all parts of the filter have also shared in creating the image. To have the filter affect the sky exposure and not that of the foreground, the glass will have to be held at some distance from the camera lens. The farther it is from the lens, the more noticeable will be the difference between the sky and foreground exposures. Try placing it as far from the lens as the width of the filter will cover the field of view of the camera.

Miss E. M., Reno, Nevada, says: "I have a projector and a beaded screen on which I show my Kodachrome slides. They look fine and seem to be correctly exposed when I hold them in my hand and look through them, but when they are projected, they look all washed out and as though they had been badly over-exposed. My dealer says they are well exposed. What might be wrong?"

ANS.—The probability is that the bulb in your projector is too strong for the size of the image on your screen. Try a longer throw—at night out of doors, perhaps,—and see if the colors are better. If doubling the size improves their appearance, use a bulb of lower power. Some professionals have a rheostat that is used to decrease the light for thinner slides and to increase it for the slightly under-exposed ones.

O. N., Los Angeles, California, asks: "If the image of a face is one inch high on my film when the camera is ten feet from the subject and a four-inch lens is used, how big will it be when I use a seven-inch lens at the same distance and what difference will there be in the perspective?"

ANS.—The image size is proportional to the focal length of the lens, so the face will be one and three-quarters inches high with the seven inch lens at ten feet. The perspective will be exactly the same in each case as it depends entirely upon the distance from the camera to the subject and the length of the lens has nothing to do with it.

This and That

Graininess in big enlargements is the product of more than just the film and developer you use, although they are perhaps the most important factors. A so-called "fine grain" film may be very grainy if it is developed in the wrong developer—a developer that may give splendid results with another emulsion—or if the exposures are too full. The grain problem is best met by the right combination of film and developer with proper exposure and processing at even temperatures. If you are having grain trouble, try reducing the exposures slightly and then carry out the development with every solution at the same temperature. Dry the film as rapidly as you can without using heat.

Photographers who liked the Gevaert Gevalux, the enlarging paper with the sandpaper finish that is no longer available because of its Belgian manufacture, will be interested in the new "V" surface of Eastman Kodabromide. It has practically the same surface as Gevalux plus the advantages of the faster and more flexible Kodabromide.

Agfa Ansco has announced the standardization of all developing temperatures for both paper and films at 68 degrees for easiest control and best results. Their new printed matter will carry full information on the new developing times required. Incidentally, if you are using Superpan Press, you might investigate the value of giving it a Weston rating considerably higher than the 100 now called for in daylight. We have been using 250 with excellent results.

The May issue of *Popular Photography* contains an 80-page directory of photographic equipment in addition to the regular magazine. *Popular* is becoming more valuable with each issue.

We have been using the new Burke and James Watson Portrait camera equipped with a 4 x 5 back. The camera is easy to handle and offers many attractive features. For full information write to Burke and James, Inc., 223 West Madison Street, Chicago, Illinois, and mention Camera Trails.

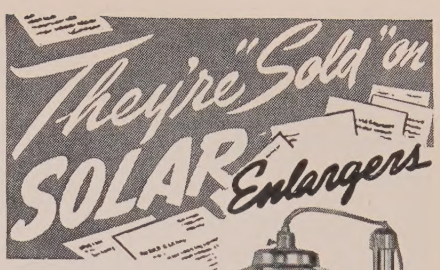
All new Filmo projectors will now handle sound films. Of course, there will be no sound unless you have the whole sound equipment, but the new machines will enable you to show films that are available only in the sound version. Bell and Howell, 1801 Larchmont Avenue, Chicago, Illinois, will send you details.

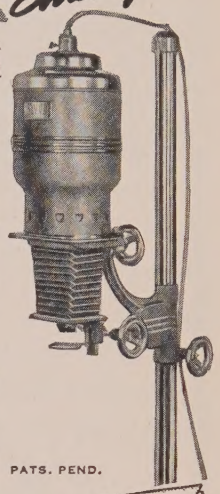
There is a new Princeton combination sunshade and filter holder that fits lens from 24 to 42 mm. in diameter. Price Industries, 130 West 17th Street, New York, will supply details of this and other camera aids if you write and mention this department.

The Eagle Photo Supply Co., 55 East 9th Street, New York, has announced Easy-Wet, a solution that may be added to developers and other solutions to make them affect paper and films more quickly and more evenly. Soaking the films in Easy-Wet after washing them eliminates water marks and speeds the drying. A complete mail order catalog may be obtained from the above, but do not forget to mention Camera Trails.

Eastman Kodak has established two new laboratories for the finishing of Kodachrome at 1017 North Las Palmas Avenue, Holly-

(Continued on page 305)





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NATURE MAGAZINE is published monthly, October to May, inclusive, bimonthly, June to September, inclusive, by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C., U. S. A., and accepted for mailing purposes at the special flat rate of postage provided for in the United States Postal Act of October 3rd, 1917, and February 28th, 1925. Additional entry at Greenwich, Conn. $3.00 a year; foreign $3.75.

Publication and Editorial Office, 1214 16th Street, N. W., Washington, D. C. Additional Office of Publication, Greenwich, Conn.

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CAMERA TRAILS

(Continued from page 303)

wood, California, and at 1712 Prairie Avenue, Chicago, Illinois, in addition to the old plant at Rochester, New York. Send your Kodachromes to the nearest one.

Burleigh Brooks, 126 West 42nd Street, New York, is manufacturing 6.5 x 9 cm. plate holders and cut-film sheaths for users of Maximar, Bee-Bee, Recomar, Voightlander and other plate cameras. Ask for their complete catalog.

We have arranged with the manufacturer to supply readers of this department with the latest data sheet on flood and flash bulbs for black and white and color photography. The sheets give all the information you need for working in artificial light and are yours for the customary three-cent stamp sent to Camera Trails. Ask for Wabash sheet 732-P.

Camera Trails is conducted for the benefit of Nature photographers and maintains a service for their help. Questions will be answered in the new Problem Corner or by mail, and your editor welcomes both questions and any suggestions you may care to make. Address your communications to Norris W. Harkness, NATURE MAGAZINE, 1214 Sixteenth Street, N.W., Washington, D. C.

Stumped Again

We thought we had finished the series of stump poems inspired by L. L. Thompson's verse in our February, 1941, issue. However, it seems only fair to close the matter with Mr. Thompson's rebuttal. In sending it in, Mr. Thompson, who is superintendent of schools in Baldwin City, Kansas, says: "The past six years we have had thousands upon thousands of trees die in our state and the surrounding territory because of the drought. They have been grubbed out, cut down, or left to fall. If Kansas stumps could be dressed as the poets from California, Maine and Oregon have been able to do, I could doubtless see a cloak of beauty, worn even by a stump, but during our excessive dry spell even fungi have been unable to grow." So Mr. Thompson entitles his rebuttal, "Stumps are Stumps," writing:

Stumps are ugly; nothing more,
When shorn of ivy, lichens, moss;
When stripped of glories that are past,
A stump is worthless; so much dross.

Some trees give lumber, beauty and,
To be sure, sea-going spars;
Plus sentiment, and shade for rest,
But stumps to me are landscape scars.

He deals in camouflage, I feel,
Who would a stump dare glorify—
I see the Master in the tree,
But stumps I will not deify.

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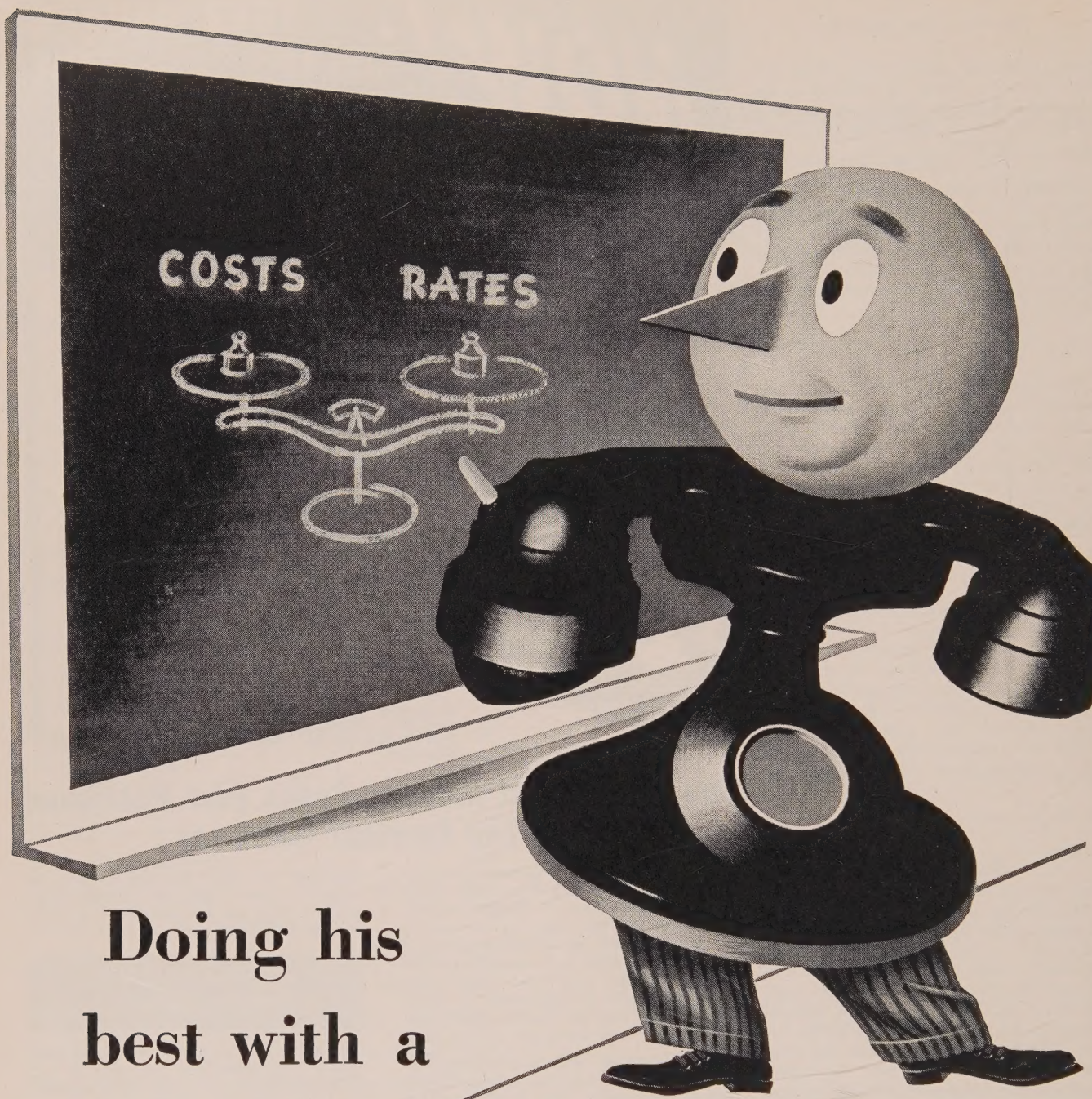

Doing his best with a tough job

The hardest job of the Bell System is to give you more and better telephone service and yet keep rates low. It isn't easy to keep those two things in balance. Increasing costs and taxes make it difficult.

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Nature in Print

By HOWARD ZAHNISER

THIS is a celebration and a supplication.

Edward A. Preble will be seventy on June 11, 1941—"threescore years and ten; and if by reason of strength they be fourscore years"—may the rest of the text be forgotten!

Congratulations to him for more than half a century of success in advancing the knowledge of Nature and the cause of Conservation!

Thanks to him from hundreds of individuals for his earnest, considerate helpfulness, and thanks, too, from the general public—present and yet to come!

Best wishes from all and for all—best wishes for a decade and more of further service, more complete expression, and a due measure of satisfaction!

Look among the back numbers of NATURE MAGAZINE and find in the issue for August, 1932, an article about Mr. Preble by Paul F. Hannah and Evelyn Preble Walters. Read it again for the celebration, and for the enjoyment of the article itself—an excellent sketch of one of the Earth's rare characters.

There are only a few matters of record to add now. In 1934 Mr. Preble revisited the Athabaska region and its waterfowl breeding grounds, deepening the concern for migratory-bird conservation that has been the constant companion of his thinking for the past decade. On June 30, 1935, he retired from the Bureau of Biological Survey, after forty-three years of service, and since then he has given NATURE MAGAZINE full-time service as Associate Editor. The "shack" along Bullneck Run in Virginia is no longer his, but he now has enough New England acres to satisfy his love of land—wild forest land that may become a sanctuary and wildlife study area, abandoned farm land with old buildings enough to provide him all the fixing and mending and tinkering he may want through many summers. However they may seem to him, his New Hampshire summers are longer now, and his year-round troubles are more of his own choosing than they were in 1932.

Add these developments to the sketch by Mr. Hannah and Mrs. Walters and the story is once more up-to-date—a well-continued story but fortunately not concluded. There is more to come, and much of this "more" should be of the sort that may be described as Nature in print. With congratulation it can be said that readers who have not seen Mr. Preble's writings of fifty years have missed some of the richness of their time. With supplication it can be added that all of us are going to miss a lot through much time unless, as John Keats once expressed a similar fear, his pen gleans further his "teeming brain" and we have a sheaf of essays and a book or two that will:

Hold like rich garners the full ripened grain.

Mr. Preble's very first publication, a short article on Canada nuthatches in the April, 1893, *Ornithologist and Oologist,* indicated clearly some of the outstanding qualities of his writing—a faithful reporting of deliberate observations and a charm of style expressing a sympathy with wild creatures and a love of the land. Mr. Preble took his first opportunity in print to describe the town of Ossipee as "beautifully situated among the hills of east central New Hampshire." The nuthatches, he admitted, had "neither beautiful songs nor brilliant plumage," but he praised them, significantly, for "their great industry and evident cheerfulness under all conditions." Add to these early and continuing qualities of writing the mature force that comes with clear vision, rich and wide experience, unimpeachable integrity, and uncompromising conviction, and the result is the potential essayist and conservation advocate that is Edward A. Preble in the decade that has just begun.

Already, of course, Mr. Preble has seen enough of his own publications to tempt the pride of a less humble and unassuming person. His 574-page masterpiece—so far—*A Biological Survey of the Athabaska-Mackenzie Region,* has made a permanent contribution to geography and natural history and is one of the most interesting works of its kind ever published. There are eight other Government publications that he either wrote himself or contributed to as an important collaborator. The periodicals of the last forty years are enlivened by hundreds of shorter articles, though not all of these are easy to find, for Mr. Preble has often given the best of his writings to magazines that are not in general circulation. A series of essays on the twelve months, his "Nature calendar," for example, was contributed during the year 1927 to *The Elementary Magazine,* and only recently one of the most enlightening, cogent, and convincing discussions of our waterfowl conservation problem was rescued from the files of a newspaper by Frances E. Clarke in her *Great Wings and Small* (The Macmillan Co., $2.50). Fortunately, however, from its very beginning NATURE MAGAZINE has been a thesaurus for Mr. Preble's writings. Between 1924 and 1935, in accordance with a practice of the Biological Survey, Mr. Preble furnished the Bureau's editorial office an index card for each article of his that was not published by the Government, and the number of these cards is 115. Eighty-five of them were in this magazine. Readers of this page who have saved their earlier numbers could thus certainly have a rich enjoyment and an inspiring benefit by browsing through them, and others have the opportunity of a profitable excursion to the public library. It is amazing to note the wide field of Nature that these short articles cover and delightful to find the apt and pleasing expression that characterizes them. They certainly whet the appetite for more.

There is apparently only one main reason why Mr. Preble has not already written more than he has. He has been too intently busy helping other writers and helping readers in other ways. The ten-year and annual indexes of NATURE MAGAZINE have, for instance, been his painstaking work. Through hours upon hours of unhurried critical editing during past years he has spared the readers of this magazine, or of the *Journal of* (Continued on page 350)

THE SEDGE WARBLER SLIDES DOWN A RUSH TO ITS NEST

NATURE MAGAZINE
VOL. 34 · JUNE-JULY · 1941 · NO. 6

Birds and Blitz

Country residents pursue their ways despite the war

By L. J. LANGFORD

Photographs copyright by the Author

IN BOMB-BATTERED Coventry, Bristol, and many other British communities, thousands of homes have been reduced to rubble. Thumbs up, their owners carry on, and so, also, do the birds that have learned to build homes and rear their families in close association with man. No doubt, there have been avian casualties from enemy high explosives, and there may be more during the nesting season of 1941. On the whole, however, it is not believed that the song and insect-eating birds have been materially affected by war. This is definitely the case with those birds that have not adapted themselves to life close to man, but have sought farm land enclosed with hedgerows of hawthorn, bramble or hazel, or pastures, woods and moors for their habitat. Few bombs and incendiaries are wasted there.

It is to such areas that the British bird-lovers—and their name is legion—turn for the relaxation afforded by a bit of "birding" in times of blitz. One bird they will seek out—a veritable symbol of hope and courage—is the skylark. A species very tenacious of its habitat, it is not unusual to find it clinging for a time to a suitable site even where building is going on. Finally, however, it will seek the rural countryside it most desires. One of my clearest memories of the first World War is that of a skylark singing above a French front-line trench in the warm sunshine of an August afternoon.

The male skylark pours out a flood of melody as he

THE SKYLARK CROUCHES PREPARATORY TO ITS ASCENT

The male bird pours out a flood of melody as it climbs to an altitude of perhaps fifteen hundred feet, whence the song floats down although the bird may be almost out of sight

MALE YELLOW WAGTAIL WITH FOOD FOR ITS YOUNG

(Below) The whitethroat warbler at its nest that is built in a small alder overgrown with brambles, a typically favorite site of this bird

ascends perpendicularly to an altitude of perhaps fifteen hundred feet. The trilling notes float down to earth quite strongly, although the singer may be almost out of sight. After an interval of perhaps fifteen to twenty minutes he spirals down to earth again, the song in descent being quite distinctive from that when soaring, and he is always careful to alight at some distance from the nest. This is invariably built on the ground, usually in a slight hollow—such as a hoof mark—sheltered by a tuft of tall grass. Five or six eggs are laid. When the young hatch, both birds run through the herbage carrying flies or caterpillars as food for the nestlings. Strangely enough, the skylark often ascends directly from the nest after feeding, bursting into song immediately. Frequently a hay field is chosen as a site for a nursery, but this is not as favorable as a cornfield or rough pasture, because if the young are not ready to fly early in June, they are likely to be killed by the mowing machine when the hay is cut. In winter the birds gather into large flocks, which probably are reinforced by visitors from the mainland of Europe.

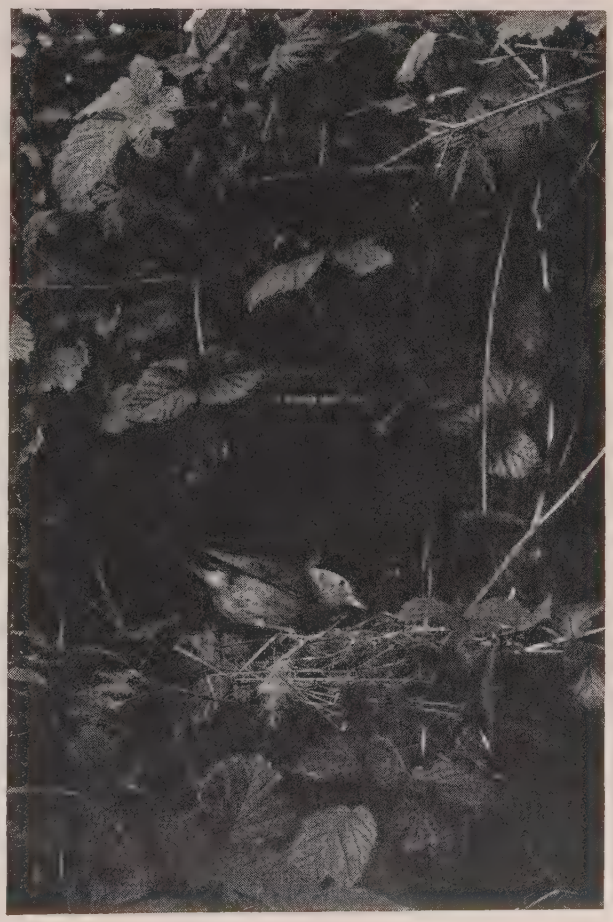
Another resident species, and a charming singer, is the song thrush. When he has nestlings to feed he does not hesitate to visit lawns on the outskirts of large cities. Purposeful and intent, poised and perfectly still, he listens for the movements of earthworms. A tilt of the head, a few rapid hops, a deft stab in the soil and the bird is struggling backwards, tugging at five or six inches of elastic breakfast, which is to be broken up into suitable pieces for a growing family of four or five young. He has also acquired the habit of hammering a snail on a stone to break the shell. The nest is usually built on a tree stump, in ivy or in a thick bush. Its inner lining is a strong, waterproof plaster made

of rotting wood rounded to a perfectly smooth cup by rotations of the female's breast. The sky-blue eggs, purple blotched, are beautiful. The young remain in the nest until they are able to fly—a period of fourteen days. There is perhaps nothing in the bird world quite so insolent in appearance as a young thrush seen head-on. Its beak is tilted up and the unfeathered yellow gape adds solemnity to a pose that is distinctly humorous.

The warblers are all summer migrants to Britain. As their food is entirely insectivorous they must spend the winter away, south of the Mediterranean. One of the first species to return is the chiff-chaff, which often reaches the southern counties of England by March 21, and which is closely followed by the willow warbler, the sedge warbler, and the whitethroat. The sedge warbler, like the reed warbler, haunts the margins of rivers, canals and lakes. It is voluble, frequently breaking forth into indignant protests if disturbed, even at night. The reed warbler builds a deep nest attached to three or four reed stems, its depth being necessary to prevent the eggs rolling out as the reeds lean over in a high wind. The sedge warbler usually builds a shallower nest in a spray of sallow, or in a bramble overgrown by other dense herbage. Both species are wonderfully agile, sliding down the reeds or rushes to the nest with great rapidity to feed the young. The sedge-warbler nestlings shown in the frontispiece were almost ready to leave the nest. Only a few days previously the nest had held five naked chicks. As the rushes were parted on the day the photograph was taken, two of the young at once scrambled over the rim of the nest, to disappear completely into the bush. Their haste seemed almost indecent. Within half an hour the old birds had

THE SONG THRUSH BRINGS FOOD TO SLEEPING YOUNG

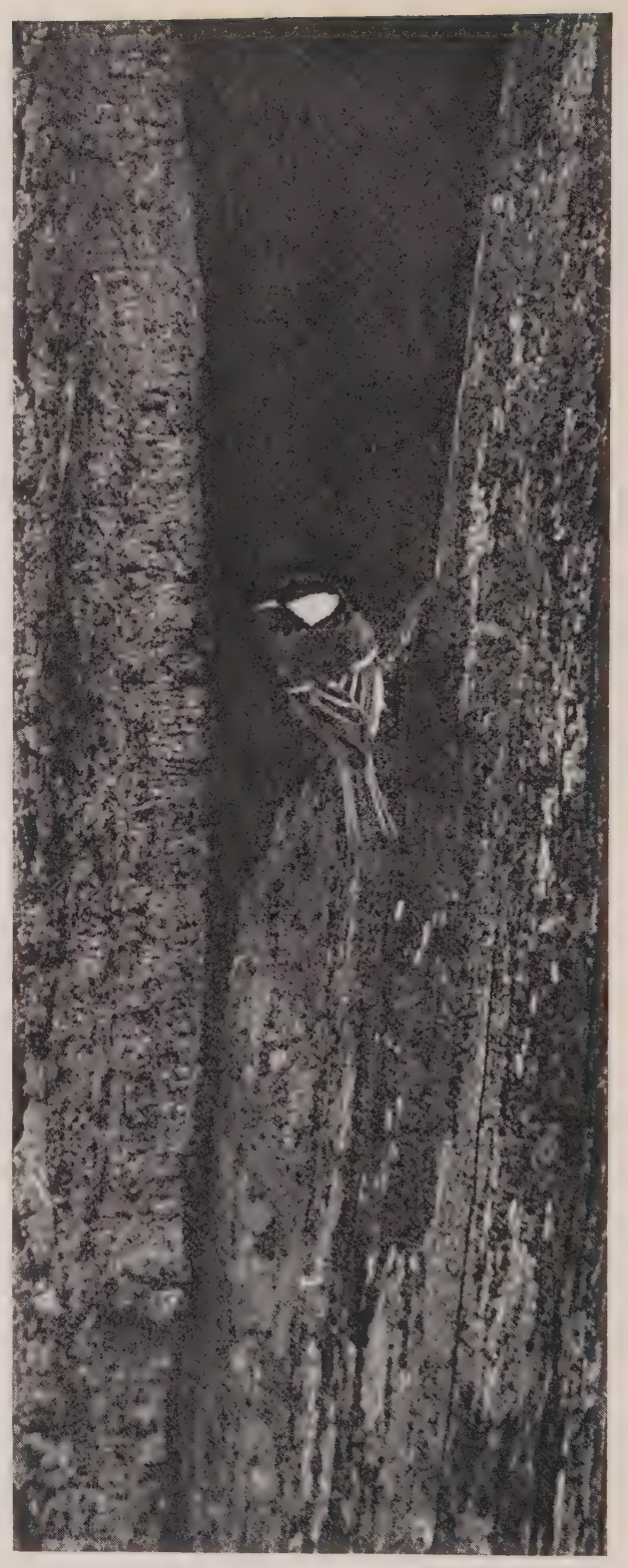
(Below) The garden warbler at its nest built in a bramble thicket. This warbler is a close relative of the whitethroat and is similar in appearance



succeeded in calling the remainder one by one into the tangle of herbage where they collected and fed them.

The whitethroat is found most frequently on waste land that is overgrown with brambles, or on scrubby hillsides. It is also a wayside bird where hedges that are broad rather than tall are found. It has a habit of scolding at the approach of the pedestrian, flitting from the topmost spray of a bush into and along the lane for perhaps twenty yards. It repeats the artifice two or three times until the intruder has been decoyed a safe distance from the precious eggs, held by the slight cradle of hay, often placed in a patch of nettles close to the roadside. It is not easy to distinguish the whitethroat from its near relative the garden warbler. The whitethroat's back is a richer shade of brown and its breast is paler. The male puffs out his throat when scolding, and his tail is longer and more rounded at the tip. The garden warbler, which has a pleasing song, is not so demonstrative and keeps to denser cover. Often its nest is placed in a gooseberry bush or other shrubbery.

Another species, not a warbler, which is most useful in gardens, is the hedge-accentor, also known as the dunnock or hedge-sparrow. Its cheery little song is heard from any slight eminence such as palings, or the top of a fruit tree, and in the intervals between the bursts it helps its mate to build a beautifully finished nest, placed perhaps in the woodpile, or in an ivy-covered stump. Five or six unspotted sky-blue eggs are laid. When seen within the horsehair cup, these are as beautiful as an April rainbow. These birds will search a newly-turned furrow from early morning until it is almost too dark for one to identify the species with any certainty.



GREAT TIT AT ITS NEST ENTRANCE
A pair of these birds will destroy innumerable caterpillars in rearing their brood of eight or nine young. It is a valuable aid to the farmer

The tits—or titmice, as some prefer to call them—are a numerous family of brightly-colored, active birds. They are largely resident, although considerable local movements occur in winter. In fact, it is difficult to say that a particular species is resident as the individuals appear to move on at some seasons to give place to others of the same species. From January to March, great tits, cole tits, and blue tits have fed with robins on a coconut within a few feet of my window. One end of the nut was sawed off and the hollow interior filled with beef suet. Undoubtedly, this food is most welcome in severe weather when the ground is frozen or snow-covered, but it does not entirely take the place of natural food, as these acrobatic little birds are often seen suspended head down beneath the nut, searching industriously for minute insects in the fibres of the husk. Great or blue tits take readily to nesting boxes where these are provided in suitable situations. The birds appear to prefer boxes that are placed on the north side of a fairly large tree out of the reach of cats and other enemies. They do not appear to object to suitable sites quite near human habitations, and nests are sometimes found in a letter box or in a pump. I have seen one nest in the buffer of a railway truck, and the eggs in it were warm. Frequently, two broods of eight or ten young are reared in a season. Thousands of small caterpillars are fed to the nestlings during the period April to June. From the blind, it was observed that the interval between visits of one bird of the pair was seldom more than four minutes. The immense benefit to agriculture is apparent.

Our wagtails are commonly (Continued on page 351)

TWO FOSSIL CONCH SHELLS DUG FROM A RIVER BOTTOM

They are examples of both right-handed and left-handed twirl. On one fossil bed it was found that about one out of four shells took the left-handed, or *perversum*, direction

CONCHS

By IVAN R. TOMKINS

"CONCHOLOGISTS," said a friend, "are peculiar people, for they throw away the animal and worship the remains."

These shells, which have been house and skeleton for many different animals, are now preserved in many collectors' cabinets. Shells from animals that have lived on sea beach or sea bottom, on land or in trees, all possess beauty of form or color in some degree. Yet the first interest must remain in the animal itself; in the occupant and what it was and what it did, rather than what it left behind.

There might be disagreement as to which shell is best known to the greatest number, whether the clam, the scallop or the oyster—if of the pearl-bearing species—or which is the more valuable, possessing little natural beauty of form or lustre but still furnishing food for many, and, indirectly, food and shelter for many more.

Our guess would be that best known of all is the conch. Some species of this gastropod live all around the globe in suitable waters, and travelers have always brought in the shells, because of their size and beauty. Cameos have been carved from them. The Negroes of the south Atlantic states use them in decorating graves. Some persons there still believe them to have some bad luck influence, but over much of the civilized world the shells have been carried far inland and handed down for several generations as keepsakes and decorations, or the end has been sawed off and the shell used as a blowing horn. The American Indians used the centers for drills; sometimes passed sticks through holes in the shell and made rough hoes, or used them in various other ways.

It is not likely that any gastropod of such size and weight could live on land or climb trees, and there are other adaptations to a life in the salt water of the sea, where the weight is lessened and a strong shell is necessary to withstand the pounding of surf.

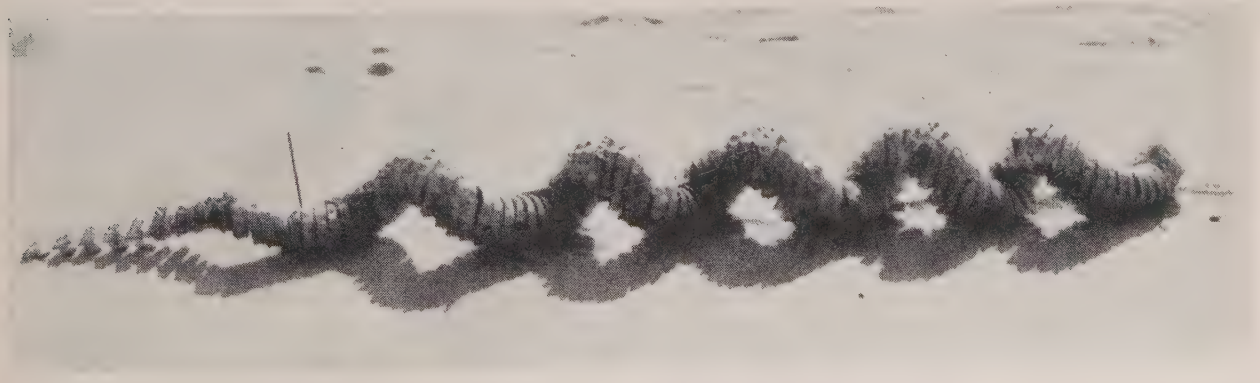
In some seas there are only conchs that wind to the right or clock-wise, while in other places left-handed, or counter-clockwise, shells are found. In one bed of fossil shells uncovered, about one out of four shells was left-handed. Conchologists have given the specific name *Buscyon perversum* to the ordinary conch of our Atlantic coast when it winds to the left.

This species lives from near low-water mark on into water that may be fifty feet deep or more. In one of the Georgia sounds the prawn fishermen do not drag their nets over certain places because they will load the trawl with conchs, which are not commercially valuable.

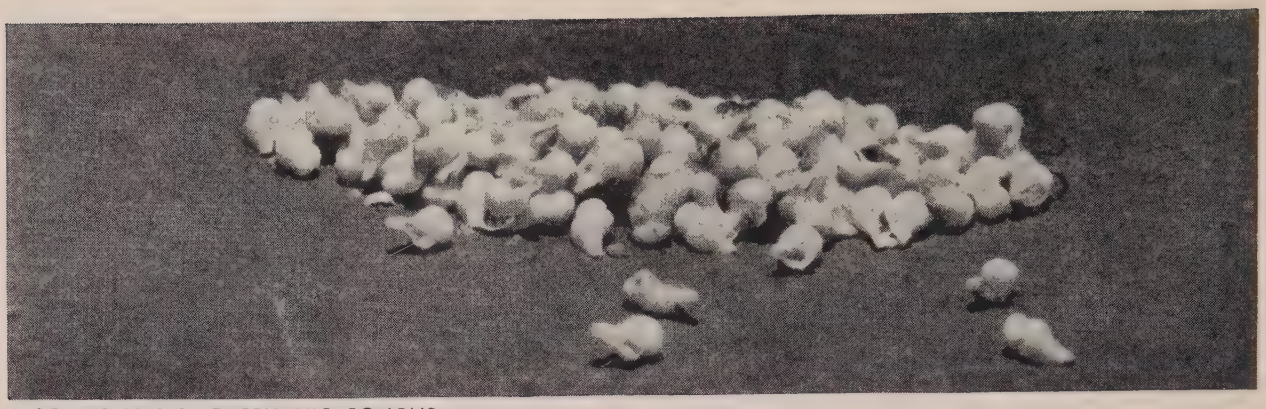
Many shellfish are carnivorous, particularly the gastropods, and this species has a tongue bearing many small rasp-like teeth. The oyster drill, *Urosalpinx cinerea*, is bet-

EGG CASE OF THE COMMON WHELK WASHED UP ON THE BEACH

When attached this case is moored by the small end. The casual observer usually does not realize that this odd spiral affair contains eggs of any kind



ALLEGHENY COLLEGE LIBRARY



A COLLECTION OF EMBRYONIC CONCHS

They are shown about three times natural size. It has been estimated that if about one out of 20,000 of these comes to maturity the species will be able to maintain itself

ter known in that capacity, and with its tongue soon rasps a hole in the hard oyster shell.

The eggs are laid in tough parchment-like cases that withstand the pounding of seas, and are often washed loose from their moorings, where they are attached by the small end, and cast up on the beach. When they are found, the casual observer will seldom realize that this spiral arrangement contains eggs of any kind. There may be one hundred capsules in a string, and each capsule may contain fifty embryonic conchs, floating in fluid that supplies nourishment until the young animals have grown a turn or so of shell. The first turn is smooth and is called the protoconch. It is surprisingly similar in many shellfish that when adult are widely dissimilar. Before the young leave the egg capsule, the shell begins to show tubercles like those of the adult.

It has been estimated that if one out of 20,000 embryonic conchs come to maturity, the numbers of the species will not grow less. Such prodigality of seed is common all through the animal and vegetable kingdoms.

Everyone knows that clam chowder is edible, and some other shellfish are commonly used for food, as scallops and oysters. And to some persons conch chowder is equally desirable as food. The food-producing potentialities of the sea have been exploited along quite a number of lines, but there remain still many unexplored possibilities.

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A Woodland Buttercup

By WARREN C. WILSON

YOU HAVE all seen the cheery spring display put on by the buttercups in our fields and pastures. Did you ever see the exhibition staged by the early woods-buttercup, called by the botanists *Ranunculus hispidus?* This plant brightens up thinly wooded spring hillsides from Vermont to North Dakota, and southward to Georgia and Arkansas.

PHOTOGRAPH BY THE AUTHOR

This woodland buttercup frequents dry, sandy or stony soils that are neutral or acid. It belies its generic name by inhabiting such locations. According to Gray's Manual *Ranunculus* is "a Latin name for a little frog, applied by Pliny to these plants, the aquatic species growing where frogs abound". Nevertheless, it is an attractive little plant. The glossy, golden-yellow flowers, an inch across, are carried on six-inch stems. The rather dark green leaves are palmately or pedately three-cleft and somewhat shiny.

The early woods-buttercup is desirable for the wild flower garden. It is easy to grow and will tolerate a wide variety of conditions. The plants can be depended on to bloom each year in late April or early May. They are compact and never become pests by overrunning the garden. It is a worth-while wild flower to try out in your yard.

THE WOOD TORTOISE, KNOWN TO SCIENCE AS *CLEMMYS INSCULPTA*

A friendly and valuable reptile, this tortoise merits the interest and protection of all because it is not only harmless but valuable as an eater of insects and as a scavenger

The Friendly Wood Tortoise

By HARRY EDWARD MILLER

KNOWN by a half score of local names, the wood tortoise is frequently associated with our friend, the box turtle, these being the only so-called land turtles of the Northeast. But of the two, the wood tortoise is more strictly a dweller in the woods, as the name indicates. It is not given to so many long wanderings as the box turtle, although at times it strays some distance from the country supposed to be most to its liking. It has been called the upland wood turtle, from its presence in some high wooded situations. Some call it geometric or sculptured turtle; still other names associate it with various parts of its wide range. Wandering on occasion into meadows and fields, even plodding along country road-ways, where the female frequently buries her eggs, the wood turtle most loves open woodlands, either dry or moist. It is a good-natured, inoffensive reptile, and should be carefully protected. Indeed, with the box turtle, found often in association with the wood tortoise, it has been offered a sheltering hand by the statutes of New York and New Jersey.

For comparison, let us place a box turtle side by side with a wood tortoise. The wood tortoise is duller-colored and flatter-shelled; the box turtle rounds up into a domed-top shell. There is no reason to confuse the two species, so unlike do they appear. The plates of the carapace, or upper shell, of the wood tortoise show many concentric rings appearing as though cut with an engraver's knife. This woodland friend grows to six, seven, or eight inches in length; its upper shell has a slaty-black or dull brownish-olive cast; its under shell is yellow with a black blotch on each plate. The fleshy parts of the turtle, not counting the top of the head, but including most of the neck, tail, and limbs, are of a decided brick-red, while the head, and back of the neck are usually a dull brown varied to a richer orange and even to black. Reptiles do not always present exactly the same colors or designs, and may show marked variations in different areas of the region where they roam.

The wood tortoise ranges from southern Canada into New England—where it is, in most localities, more common than the box turtle—thence all the way southward to Maryland, Virginia and westerly to Michigan and Wisconsin. It tends to a more decided preference for northern regions than the box turtle.

As the winter nears, the wood turtle retires to the mud of pools, streams, ponds, or into the earth along their shores. It spends some time around the water after coming from hibernation in April. Naturalists look upon it as more partial to water than the box turtle. Its young are just as shy as baby box turtles; so persistently do they keep under debris that you may spend years in the wooded country without having a glimpse of one such infant. In time the wood tortoise largely outgrows its shyness.

Turtle, tortoise, or terrapin—which shall we call it? There is a disposition to regard all the family of Chelonia that spend an aquatic or semi-aquatic life as turtles; those keeping to the land all, or nearly all their lives, as tortoises; those water turtles regarded as edible as terrapins. Take your choice with the wood tortoise since it divides its time between water and land and, to some, is considered edible. We should think too much of these gentle, harmless neighbors of ours to regard them only as provender.

Berries, mushrooms, water vegetation, dead fish, snails, slugs, worms, buds, land insects, wild apples—these are some of the items on the wood tortoise's bill of fare. The box turtle has a similar diet. A captive wood turtle ap-

preciates tomatoes, cabbage, lettuce, waste fruits, scraps of meat and fish and various table refuse. They thrive with a substantial meal once in two or three days. Water should always be at hand for drinking and bathing, and they need shade against the severe heat of summer. It is believed, particularly from dates noticed on some shells where humankind has cut a record, that these turtles may live to a century or more providing no untimely fate cuts them off. One of these fates today is the automobile, which crushes many that venture on the highways. Another peril are brush and grass fires, which take immense toll from the ranks of all land turtles. The wood tortoise is credited with having a marvelous sense of direction, a homing-like instinct, being able to wander far from its chosen haunts and then go unerringly back. My own observations lead me to believe that the box turtle has the same homing instinct.

In captivity, both turtles show a degree of intelligence. Some individuals will come at call; clearly know their names; will often display a fondness for their owner or other persons. It is common for captive turtles to eat out of the owner's hand.

PHOTOGRAPH BY A. C. PARSONS

THE COMMON BOX TURTLE

Often found in association with the wood tortoise, these two have much in common, being the only so-called land turtles in the Northeast

Wood tortoise and box turtle are favored pets; invariably good natured. If turtles are to remain out of doors throughout the winter, never neglect to provide them with a generous heap of loose earth into which they can burrow to escape the cold. Unless in warm quarters, as indoors, the average turtle will not be very active while winter rules; hence they will refuse food when their bodily temperature is reduced to low ebb.

Captive turtles are not inclined to breed unless their surroundings are ample and natural. While they make interesting pets, for my part the average turtle is far more interesting when it has its liberty in the fields and woods, or wherever else it cares to rove. When I see one prowling in its haunts it strikes me as a creature deserving of kindness; an humble citizen helping the farmer to keep down the insect hordes; a lowly resident seeming by its quiet manner to say: "Neighbors, give us a chance!"

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Hummingbird

By ORLO EVAN WHEELER

A dainty jeweled airship darted from the sky
And cruised with master-skill to a lily bed nearby,
Its motor softly purred.
But eye and ear had erred—
A spangled hummingbird
Paused for a sip of nectar—what chalice could resist
His plea to quaff ambrosia from Nature's alchemist.
His form was somewhat blurred
As through the air he whirred.
This restless hummingbird
Had tarried but a moment, yet none could ever fail
To note the comely midget in tailored coat-of-mail;
Whose ruby throat, all shirred,
Would seem a bit absurd
Save on a hummingbird.

Whistling swans breed in suitable places on the islands and mainland of the Arctic coast of Alaska and Canada. They nest in solitary pairs, and thus escape some of the dangers that beset colonial species. On their autumn migration they commonly travel in families, and it is an inspiration to see a pair of the great birds, with the young of the season distinguished from their parents by their slightly darker plumage, winging their way to their winter home in the south

Visits With Far Northern Birds

By CHARLES E. GILLHAM

U. S. Fish and Wildlife Service

Photographs by the Author

THE Biological Survey was greatly alarmed at the dwindling supply of waterfowl in 1935 and I was detailed, as one of several investigators, to report on their status in the great nesting grounds of Canada. We were told that about eighty-five percent of our duck and goose supply was raised in that friendly country (for present purposes Alaska must be included) north of our borders. In accordance with carefully laid plans several of us scattered throughout the several provinces that lie just north of the United States, and on into the Arctic.

For six consecutive summers I travelled from the Athabaska Delta, in northern Alberta, on into the western Arctic. I visited Victoria Island, the shores of Queen Maud Sea, Great Bear Lake, and the historic Coppermine River country. A considerable part of my time was spent in the Mackenzie River Delta, an area comprising several thousand square miles of waterfowl nesting ground. Wherever I went, some species were nesting.

The plan of reporting on the same key areas each year by the same observer promised a very satisfactory check of the trends in waterfowl abundance. After the first trip, future work could be more readily arranged and

Here is a mother long-tailed jaeger, with her downy young one, on the Arctic tundra. This is the smallest of the three species that nest in Arctic America. Jaegers are related to the gulls, but differ from them in many respects, including their habit of nesting on the open tundra, each pair by itself. All the jaegers are predatory, subsisting on what birds and small mammals they can capture, and all are amazingly active on the wing

much preliminary reconnaissance dispensed with. My early trips were entirely by water, the full length of the Mackenzie River system. Later, I hopped from one important area to another by plane, thus saving fully half of my field time for more detailed work.

It is a far cry to compare a trip into the western Arctic today with those made in earlier times, by such noted explorers as Sir John Franklin and Alexander Mackenzie. From Edmonton, Alberta, with good weather, one can usually plop down in the Mackenzie Delta in two days by plane, and the trip has been made in one. The tedious water journeys of the early voyageurs, beset with rapids and mosquitoes—in York boats, or canoes propelled with paddles, tump lines, and human sweat—are easily eliminated now through the air route. Today the Athabaska and Mackenzie Deltas are within a few hours of Edmonton. In olden times they were weeks and months.

I marvelled at the ease of getting about, when once a plane *had* been secured. Also, I revelled in the fact that, although now within easy reach, this land remains in about the same biological state that it did when first traversed by white man, except for a decrease in the numbers of the bird species making use of it.

I was glad to follow the steps of Edward A. Preble, veteran Biological Survey man, although he had preceded me by more than thirty years. Armed with a copy of his *Athabaska-Mackenzie Biological Investigations,* and some of the latest maps of the north country, from his own library, I left Edmonton in June, just six years ago.

The work of Preble has never been given due credit. His report was my bible—from the Athabaska Delta to Great Bear Lake on the Arctic Circle—and it never let me down. The labor and trials of such undertakings as his trips were, cut off from the outside world the greater part of the time, without the benefit of planes, outboard motors, or radio, can little be appreciated unless one travels that same country today. Even now, at their best, the trips are certainly no picnic.

Recently, while talking with Mr. Preble in Washington, he inquired in great detail about several areas in the Athabaska Delta. He asked me if I had ever observed Wilson snipe there in the summer months and noted their mating flights. I had—in fact, the first time that I observed their antics I spent three hours watching the performance. In the country where I had been raised, such a procedure is never witnessed, and because I am not the best reader of bird literature in the world, I had never read of these mating acrobatics.

"How many Wilson snipe did you see performing these maneuvers?" Preble inquired.

"Lots of them," I replied. "I have seen them for six straight summers in the Athabaska Delta. Must have noted this courtship performance five or six times each year."

Preble smiled: "When I was there one could see literally hundreds of them diving and zooming over the marshes, making that indescribable noise"—and he gave me an imitation.

Think of it, five or six a year as compared to hundreds less than forty years ago. Equally striking to me were my own comparisons made from year to year on other species of wildlife. Sometimes the findings were startling and appalling.

All of my observations, however, were not of a dismal nature. For example, in 1935 only one brood of young canvasbacks was noted in the Athabaska Delta. A year later, at the same place, and at the same date, three broods

The Hudsonian curlew, formerly nesting commonly on the treeless tundra bordering Hudson Bay and the Arctic Coast of Canada and Alaska, is now much reduced in numbers. The fact that it winters in Central and South America partially explains this condition. Formerly it was shot without mercy for the market as it passed southward in late summer along our coasts. It has seldom been found in the interior, even in migration. Its usual food includes crustaceans and insects

were seen. In 1937, twenty broods were observed. The past two years they are very numerous and too mixed in with each other for accurate counts. In this particular instance, I was fortunate in being able to get observations from year to year at exactly the same places on exactly the same dates.

My first year was spent in the Athabaska Delta, an area of about 2500 square miles. Here I found eighteen species of ducks nesting in one of the finest marsh areas on the North American continent, an area perfect for waterfowl.

The Cree and Chipewyan Indians had just completed a poor trapping season and faced a summer with little prospect of much "store food." I expected to witness great destruction by these natives to the eggs and adult birds. I was agreeably surprised to find that their waterfowl kill throughout the whole Athabaska Delta was hardly as great as that of one large duck club in the United States.

Another high-light was the discovery of a pair of black

This map, on which one-inch represents about 300 miles, should help the reader to visualize the remoteness and vastness of the region dealt with here. Naturally only a few "towns" can be shown. All of these are, or have been, trading posts. Perry River at one corner of the map, with a population of perhaps half a dozen people, and Juneau, with an estimated 4000, represent the extremes of population. Over much of this region the fur trade, now fast dwindling as a result of its own activities, permits the few thousand natives the opportunity at least once a year to exchange their furs for the few necessities that civilization contributes to their economy.

This great region, with the country that borders it on the East and Northwest, produces by far the major proportion of the ducks, geese, swans and shorebirds that constitute North America's share of this great natural resource, the maintenance of which is the concern of a treaty between the United States and Canada. Its inherent possibilities are best illustrated by an airplane map, which shows that practically all the area is densely spotted with lakes and marshes, averaging probably as high as twenty to the square mile, each of which may furnish a breeding nursery for waterfowl

A mother willow ptarmigan in summer plumage. The watchful attitude makes one suspect that she has a young brood hidden nearby. Probably the father bird is not far away, for he shares in family cares. In the Mackenzie region one is almost sure to meet with this beautiful species when he reaches the treeless area. On the high mountains to the west the species ranges south to about fifty-four degrees latitude. The winter plumage is pure white excepting the tail feathers, which remain black

ducks, the first that the natives had ever seen in the Delta. In the succeeding five years these birds have increased.

In 1936, I again visited Athabaska Delta, then pushed on into the Eskimo country, reaching Aklavik, in the Mackenzie Delta, in August. Quickly I discovered that one that far north could not buy his way. There were no guides—or craft—available for exploration. People were too intent on their fishing and the pursuit of white whales to meet their winter needs, to be interested in money. One cannot eat money. Fortunately, through a great break of good fortune, I hitch-hiked a ride in a plane to Tuktoyaktuk, with the Hon. Ralph G. Parsons, Fur Trade Commissioner for the Hudson's Bay Company.

We flew over the vast Mackenzie Delta, an area of some ten thousand square miles. Countless hundreds of lakes were in evidence, and dozens of meandering channels split up and wound sluggishly into the Arctic Ocean. Probably three-fifths of the area beneath us was water, sufficient habitat for all the nesting birds in the world, I thought.

As we neared the coast, the timber disappeared, and far ahead we could see the fog rising from the ice pack. From an altitude of fifteen hundred feet I saw numerous swans on the lakes of the Barrens. Along the east side of the Delta we followed the Caribou Hills. Even on the top of this elevation, lakes were still very numerous.

This flight was the first commercial one ever undertaken to the Eskimo village at the mouth of the Mackenzie River. I visited with the natives from Banks Island and learned just enough about their birds and mammals to only whet my appetite for another better-planned trip into this country. I was told that great colonies of lesser snow geese nested on this large island, and that pintail ducks were not entirely unknown.

One of the Eskimos, Billy Banksland, had spent years with Stefansson, and knew the English names for many waterfowl. Also, it was on this trip that I met Angus Gavin, young Hudson's Bay trader, and confided in him my ideas as to the possible nesting grounds of the Ross goose. He was greatly interested, having knowledge of J. Dewey Soper's discovery of the breeding place of the blue goose, and the fame that went with it. We spent considerable time discussing possible places to explore, and he helped me in my interviews with the natives.

From Tuktoyaktuk I scouted the coast, and the Barren Land lakes closely adjacent. Here I found old squaw ducks, pintails, and many of the shore birds. Whistling swans were observed and many gulls and jaegers. The Commissioner's plane left all too soon, but I resolved to return another year, and laid the groundwork for this.

In 1937, I made my usual pilgrimage into the Athabaska Delta, and then, before going to the lower Mackenzie, flew in to Coppermine, on Coronation Gulf, seeking further data on the Ross goose.

I now had a chain of occurrences of these birds, from their last known resting place, in the Athabaska Delta, northward into the unknown of the Arctic. Strangely

Two forms of brant nest in the American Arctic, always near salt water. The eastern ones follow the Atlantic Coast, and Hudson Bay, and on to their winter home on our coast. The western ones (black brant) go down the Pacific Coast, those from the Mackenzie region crossing Yukon and Alaska, to winter on our western coast, especially in California. From the slaughter possible from winter concentrations, they are becoming pitifully scarce, but we still shoot them for two months

these observations, along their northward migration, did not come from any bird literature, but, instead, from trappers of the Barren Lands out of Ft. Resolution. The D'Aoust boys, the Peterson brothers, George Mangrum, and others, had told me of their findings. These I plotted, and decided that this little-known goose must nest on Victoria Island, or immediately to the south of there, on Perry or Ellis Rivers.

The Banks Island Eskimos knew nothing of it, and I felt that they were well qualified to judge whether this bird was ever found there; some ornithologists suspected that here would be found their nesting ground.

Possibly, I reasoned, the birds might nest in the vicinity of Coppermine, but I was sorely disappointed. A reliable white trapper and some natives had sighted about ten of them a few weeks previous to my visit, but the Eskimos said that these were the first they had ever seen. They were of the opinion that the nesting ground was somewhere east of Kent Peninsula. This information checked with my findings and mappings and I resolved to try another year to get farther eastward.

Leaving Coppermine, I flew to the Mackenzie Delta by the way of Great Bear Lake. My plans were to visit a large colony of lesser snow geese that nested in the vicinity of Kendall Island, a little-known region seldom visited.

After several false starts, with a white man who had never visited the area, the location of the nesting geese was found, but not a single nest was in evidence. An unprecedented flood at the height of the incubation period had completely inundated the mud flats utilized by the birds, and totally destroyed their nesting attempt for that year. A few black brants were found, and nine youngsters banded. Two of these were later killed in California.

I returned to the states with a lasting impression and a firm conviction that, aside from the hunter, the greatest enemy of such waterfowl is abnormal weather occurrences. It had been most forcibly brought home to me on the mud flats of Kendall Island—and nothing can be done about it.

My fourth trip into the North followed much the usual procedure. After checking the birds in the Athabaska Delta, I flew to Victoria Island, landing at Cambridge Bay. My mapping of Ross goose occurrences pointed definitely to this area, but the natives did not know the birds. I was sure that if they nested east of this area, they would have been found, for there has been much travel and exploration out from the Hudson Bay side. Evidently their nesting grounds were to the southward, on the mainland of North America, across Queen Maud Sea.

I was surprised to find considerable bird life on the bleak rocky wastes of Victoria Island. King eiders, a few pintails, two families of Canadian geese, and six sandhill cranes were the most noteworthy of my observations, but several species of shore birds, as well as gulls, jaegers, ptarmigans, terns, and Lapland longspurs were also com-

mon. Seals, white foxes, and lemmings were also seen.

Leaving Cambridge Bay, I flew to Perry River and attempted to land there at the Hudson's Bay Post, but too much floe ice prevented grounding. Angus Gavin was trader there and we saw him as we circled about. As it was in the middle of the night, he lighted a fire, thinking that we could not see the little trading post among the tiny islands at the mouth of the river. Inland we could see luxuriant green vegetation and many lakes. White birds on some of them suggested Ross geese.

We were forced to return to Cambridge Bay, and there my pilot left me. Almost two weeks later Angus Gavin arrived by Eskimo schooner, from Perry River, and brought some interesting news of the geese. He is a master of the Eskimo dialect and offered to interpret for me while I quizzed his boatmen regarding the bird-life at Perry River. This convinced me that the Ross did nest in that vicinity.

First, I inquired if they knew the bird, and, for the first time in my life, found an Eskimo who had a name for it. Yes, they called them "Ka-grak." Also, they had seen the eggs and the young at a large lake some fifteen miles south of Perry River. This body of water, it seems, is filled with small islands and is known as "Pick-kee-oo-lak"—or the place where the birds nest.

While this conversation was taking place, Mr. Frank Milne, then Hudson's Bay trader at Cambridge Bay, joined us and assisted in the discussion. He is a much better bird student than Gavin, but not as good at Eskimo dialect.

As neither Mr. Gavin nor Mr. Milne knew the color of the head of the young of the Ross goose (it is a bright yellow), I questioned one Eskimo, who could not speak a word of English, through Mr. Gavin. The Eskimo hesitated and looked embarrassed. Finally he spoke. "He said the head is bright," said Gavin. That meant little to me until Gavin elaborated further. The Eskimos have few names for colors. Black, white, and red are the only colors for which they have words. Yellow would be bright, and few if any other colors would come under this term.

Two years later Gavin visited "Pick-kee-oo-lak" and discovered the nesting ground of Ross goose. He deserves great credit for the interest he took in the search and his patient inquiry for information from the natives. Like many of the Hudson's Bay traders of other days, he has greatly added to our store of wildlife knowledge.

In August, when the sea ice cleared, I travelled out on a small schooner to Tuktoyaktuk, in the delta of the Mackenzie. We were fourteen days on our way through the western part of the historic Northwest Passage.

The greater part of the last two summers in the North, I spent in the western part of the Arctic. Each year the Athabaska Delta was visited, and then I would take a plane to the Mackenzie Delta. Two nesting seasons were spent with the lesser snow geese on the mud flats near Kendall Island, with no land in the Arctic Ocean to the westward short of Siberia.

These low-lying flats, in any ordinary season, are a bird paradise. A few wandering Eskimos sometimes set their traps for white foxes on them in the winter; or make an occasional half-hearted summer foray to them in the nesting season to gather a few eggs or moulting geese for food. Their destruction to this colony of birds is not as great as that of one Lousiana shooting club.

Mixed with the geese were nesting old-squaw ducks, an occasional whistling swan, Arctic loons, greater scaups, and, in one instance, a pair of American roughleg hawks. The latter, far beyond the growth of trees, used the high stump roots of a drift log on which to build their nest.

Here, too, I found a few Sabine gulls and their nests, northern phalaropes with their four eggs concealed in the grass of the tundra, and glaucous gulls. Southward about twenty miles, where low willows struggled for an existence, were white-fronted and Canadian geese, a few pintail ducks, and little brown cranes. Thirty miles farther inland, within the delta, were lesser scaups, mallards, scoters, widgeons and green-winged teals.

Of interest, and possible record, on the coast of the Arctic Ocean I found one nesting green-winged teal, a few pintails, a pair of Hudsonian curlews, and a Hudsonian godwit. This last bird was the only one I ever saw.

Missing were the Eskimo curlews that I hoped against hope I might find. Instead, I did observe, for three summers, some eight pairs of Hudsonian curlews. Lesser yellowlegs, as far as the growth of trees, were not uncommon, and I never did, and never will, get accustomed to seeing both the curlews and the yellowlegs alight in the willows.

After six years, following in the footsteps of Preble, in the Athabaska Delta area, I have decided that it, like the Arctic, will long be a favorable nesting ground for waterfowl. Man has harmed it little; can change it little.

Such destructive bugbears as crows, jackfish or great northern pike—aye, even the natives—are not taking a great toll of birds. Probably not nearly as large a percentage now perish from these factors as in the past. The greatest enemy in this area is the uncontrolled forest fire. Fires do not destroy a great number of nests, but they do denude the land and ruin its water-retentive qualities. But few birds perish for want of water north of the agricultural belt, and I do not think ever will.

Practically all species of ducks are on a steady upswing in numbers and are making a good recovery; there is little doubt of this from the indications in the nesting areas. Native hunters are wonderful observers and are loud in their acclaim that waterfowl are now returning.

An aerial view of all the country of central Canada, north to the Arctic Coast, shows one great panorama of lakes. There is more water than there is land in many sections. The population of human beings in all of this vast area numbers only a few thousand. It is ridiculous to speak of restoring this country to waterfowl. All we need do is restore the breeding waterfowl to it!

The one thing necessary, as I see it, to the welfare of waterfowl is to make sure that we provide them with comfortable quarters and sufficient food during their sojourn in the United States. Then, to increase their numbers, all we need to do is to kill fewer of them while they are here. There is nothing that can add so surely to a greater population in ducks and geese as the sending of more of them back yearly to nest in Canada and Alaska.

A Curious Weasel

By R. J. HASSMAN

ONE cold morning on a ranch near Bozeman, Montana, I had an interesting adventure with a very curious weasel. There was a wood-pile near the ranch house, and I had been assigned the job of preparing fuel for the kitchen stove. In place of a hat I wrapped a large, red neckerchief around my head, turban style, picked up an axe and headed for the wood-pile. After splitting wood for the best part of an hour, I heard sounds of scratching somewhere in the wood-pile to one side of me. I stopped work and listened. It could be a rat, I reasoned, or some kind of ground bird, and I waited patiently for the creature to make its appearance. To my astonishment a weasel suddenly popped out from under the pile and seemed to be as much astonished to see me as I was to see him.

STANDING LIKE A SQUIRREL BEGGING PEANUTS
The little weasel was snapped as he popped out from under the wagon box, and once he posed on the end of a log, eyes fixed on the red bandana handkerchief

The meeting was brief, for the animal immediately ducked back into the wood-pile. I remained quiet and waited, hoping he would show himself again. He did, this time coming out from another hiding place, and I at once "froze" so as not to frighten him away. The wind was playing with a loose end of the red bandana on my head, and I was disturbed lest this spoil my game. But, in fact, the weasel advanced toward me, bit by bit, and then would turn tail and run. After about ten minutes of pussyfooting and sizing me up, the little fellow came to within five feet and took a good look, always staring at my head. I did not "bat an eye", fearing to scare him

STARTLED, THE WEASEL SOUGHT REFUGE UP A TREE

However, he posed graciously, looking over the stub of a dead branch. In his eyes was an expression that seemed to urge the photographer to go away and stop bothering him

away. Then it dawned on me that he was really curious about my red head-piece, which suggested that I could use it as a lure to snap some pictures of him at close range.

The weasel darted away when someone slammed the kitchen door, and that was my cue to run for the camera. I was back at the wood-pile in no time and cautiously took my old stand near a big log where I was sure the weasel would come out again. I had some doubt about results with my cheap, broken-down camera. Its greatest speed was only one-fiftieth of a second, not nearly enough speed when photographing animals that normally move during the split second it takes for a person to make up his mind to shoot. The camera was set for close range and I had to trust to luck that the weasel would come within range.

He did appear again, but seemed to go everywhere except to the spot on which the camera was focussed. It was half an hour before he decided to come close enough, and I managed to get a picture of him staring at me from the end of a log. The click of the camera sent him scurrying away, and I found that any slight movement on my part had the same effect on him. One shot was not enough to satisfy me so I tried again, and again, but always my subject moved so fast that it was next to impossible to get a good, clear shot of him.

Finally the weasel took refuge under an old wagon box, so I waited for him to come out again at the place where he had disappeared. Out he came; not only that, but he decided to pose for me, as it were, standing on his hind legs, all the world like a squirrel begging for peanuts. I shot quickly and was lucky enough to get him, because he started to duck back even as the shutter clicked.

Caution was thrown to the winds after that and I followed him everywhere, hoping to get more pictures. He got a bit scary and climbed a tree, but graciously posed again on the trunk of the tree above me looking over the stub of a dead branch. From the look on his face I felt that he was making an appeal for me to leave him alone, and this I did, for by this time I had a great deal of affection for the little fellow. To me this experience seemed to prove that many animals are, perhaps, even more curious than people are considered to be.

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The Bee and The Rose

By JENNIE BAXTER

You were a rose in the garden,
I was a wandering bee.
I stopped to kiss you as I flew by,
And you opened your heart to me.

Your heart was a glowing crimson,
I loved you, but could not stay.
I took the kiss you gave me,
And went upon my way.

Weed Patches and Waste Places

The fifteenth in Nature Magazine's series of educational inserts

By E. LAURENCE PALMER

CRAB GRASS

BEGGAR TICKS

OLD WITCH GRASS

BARNYARD GRASS

COMMON PLANTAIN

KNOT WEED

GREEN FOXTAIL

SHEEP SORREL

"Just a weed patch" seems to be about all the average person thinks of a waste place. Yet, such spots afford superior opportunities for interesting studies in Nature. All one needs is a little patience, a little guidance and more than a little common sense. Once one has started to study such a place he maintains his interest indefinitely.

When I built my new home, it was on a site occupied by a glorious weed patch. As the years have gone by, the plans of the family, but not always mine, have called for increasing encroachment on the rights of those weeds. Now, the weeds have been forced off to a little corner where each year we have a fine crop of teasel, New England aster, milkweed, some startlingly beautiful evening primroses, and even some ragweed and pigweed. By keeping the garden away from that spot as much as possible, by stringing clothes lines properly, and by other devices, I have managed to keep the interest of the powers-that-be from that weed patch of mine so that I can enjoy it. It is a little game I have played with surprising success for some years now. And if this article is not read by other members of the family, the patch may be saved for many years to come.

"But why should you want to save a weed patch?" you ask. "Why don't you get rid of the things and in their place put the orthodox ornamentals?"

One reason, of course, is the little game of seeing how long I can protect them from the march of progress. Another, is that I like to look at the plants. Still another is that each year I find on them more interesting insects than I am able to find on the commonly-planted species. To be sure, some of these insects sometimes sneak down on my garden. The function of such a garden, however, is primarily to work off the energies that go with the usual garden fever of early summer.

I know that weed patches have their bad points. I do sneak in when no one is looking and pull out the ragweeds before they spread their pollen to the four winds. I break off the tops of some of the teasels and evening primroses before their fruits and seeds are shed too abundantly. Nevertheless I like those weeds. It is among them that my wild cottontails raise their litters. At the edge of the patch is a place where for years a chipmunk has survived the attacks of neighbor cats. It is in this patch that the snow stays on longest in spring and keeps the garden wet so that I will not have to spade it so soon. It is here that I go for samples of weeds when I want something for a Nature study class, a Nature broadcast, or, as in the present case, for an article in *Nature Magazine*. Why should I not protect something of such values to me? Why should I roam far for what I can have in my own backyard?

PURSLANE

DANDELION

YELLOW WOOD SORREL

SHEPHERD'S PURSE

SOW THISTLE

Weed Patches and Wildlife Management

The two essentials sought in any wildlife management program are adequate food and shelter for the species desired. *These essentials* must be attained and *maintained* at a minimum of expenditure of funds and effort. They must exist in areas of appropriate size and location to prevent undue crowding of individuals, and so that a maximum of population may be maintained per unit of space. Within certain limits, the weed patch meets every one of these requirements for such species as quail, pheasants and rabbits.

The food situation is an interesting one. Weeds vary so greatly that one can find those that have succulent vegetative parts useful as food in summer. Also, some of them produce concentrated foods in seeds and fruits through the winter months when other foods are scarce.

We hear much in text books of how many tons of weed seeds are destroyed by the juncos of Iowa or the quail of Ohio, but what does this really mean from a common-sense standpoint? The answer can be found in any weed patch in the country. Measure out a square yard, or many square yards, in the patch nearest to you. Count the number of plants of any one species in this area. If the season is advanced, the chances are excellent that this number is not great. For example, there may be but a single teasel, or at most ten flowering teasels, to a square yard. This means that to maintain teasels in that area there should be at least ten seeds that can survive. You will find any single teasel head fairly honeycombed with pits, and in the bottom of each a one-seeded fruit. Only a small fraction of the seeds of one head are sufficient to maintain the species in the area under question. And yet each plant bears many heads and there are a number of plants.

Juncos, song sparrows, quail and many other birds could eat hosts of teasel fruits and not affect the future teasel crop. What is eaten is merely a surplus that ordinarily would be almost totally lost anyway. The tons of weed seeds eaten annually by the Iowa juncos, according to our school texts, probably had not the slightest effect on the weed crops of the State. There were many other uneaten tons, but only a relatively few tons were needed to maintain the species. The quail or juncos that thrive on these surpluses are extra profit from this weed patch of ours. In game management, as in many other things, we are interested in profits we can get from products otherwise wasted.

Of course not all the weeds in a patch furnish an abundance of surplus seeds for game food. If game food is our object our weed patch should support suitable species. It should be unnecessary to list those that may be in your weed patch. I would miss many of them and you would miss the fun of discovering something for yourself. Just go out now and look over the weeds to see which of them have fruits that seem to be large enough for bird food. Probably you will find lambs-quarters, amaranth, ragweed of some sort, probably some sort of smartweed or wild buckwheat, and any number of many grasses, such as foxtail, orchard grass, quack grass or wild rye. These have seeds or fruits that, you will assume, should have value as bird food.

If you are interested in checking on this, you may do so by referring to the published lists of food plants eaten by your commoner local species. If this is not convenient, and a cat or dog brings in a dead bird, just open it to find what it has been eating. There is a good chance that there you will find materials similar to those you will find in the average quail or pheasant crop. See to it that your weed patch has a reasonable representation of large-fruited plants.

As to shelter, the weed patch is supreme for the smaller forms. Plants are so densely crowded together that we, or the hawks, the cats or foxes, can not readily see through them. Yet these plants are easily bent aside to permit the entrance of an animal the size of a rabbit, quail or even of a pheasant. All these game species have to do when feeding in the open is get to the cover of a weed patch before they are discovered and they are reasonably safe.

When much of our country was first settled, we separated our fields with huge stump fences, with rough stone walls or with rail fences. All of these were sufficiently irregular in outline to permit weeds to establish themselves in the corners. Many individual rabbits and quails lived in these weeds. Then we put up straight wire fences and cut the weeds between the posts, and had no cover, no food and practically no game. The blame for this scarcity was placed on the hawks, skunks, snakes and owls.

If you do not believe that weed patches serve such an important role in providing the necessary shelter for small

ST. JOHN'S WORT

SPOTTED SPURGE

MALLOW

COMMON CHICKWEED

game, take a walk any winter day over snow-covered ground. Where do you find the rabbit tracks most abundant? Around what kinds of places do the pheasant trails lead? Weed patches, of course. Without patches, costing nothing to maintain and available almost anywhere, game management for the smaller field species would be well nigh impossible. With the patches properly maintained to slow down the winter gales where the game is hiding, to provide concealment from enemies and for food and rest, the problem becomes much simpler.

Weed Patches and Health

If weed patches were important only in game management, however, they might not interest many people. In the earlier days before the family doctor and the corner drug store, they provided many plants of medicinal value. Heal-all and wormwood helped us because we got well to get out of having to take the stuff. We ate the shoots of milkweed and of Indian hemp for certain ills; put the juice of wartweed or spotted spurge on our wounds to help them heal. Now we know that the spurge juice can do us more harm than good.

In more recent years, when allergies have become important topics of conversation, we again find weeds and weed patches making a place for themselves. We find hay fever coming from ragweed, and special kinds from such weed patch plants as Russian thistle, timothy, wormwood and other plants that effect their pollination with the help of the wind.

They tell us that 2000 pollen grains per cubic yard from some weed patch plants is not abnormal, but when we visit these plants and shake the pollen from them we remain convinced that this number must be abnormally small rather than abnormally large. We find that these trouble-some pollen grains may be collected as high as 12,000 feet in the air, so if we are troubled by them we are hard put to know where to go to escape.

CATNIP

Weed Patches and Landscaping

A friend who is a crank on Kodacolor recently showed me his favorite pictures of last summer, and those of which he was most proud were of weed patches. There were hills with great smears of blood-red paint brush; fields blazing with a yellow flame of wild mustard and other fields white with daisies. These, he exclaimed proudly, were the best pictures he had ever been able to get of these fields, and they told him better than anything else of the value of the fertilizers and lime that had been used on the fields. And so he raved on, pointing out the beauty of the very plants he had wished could be wiped from the landscape.

Anyone interested in impressions of great stretches of territory must, if he wishes to paint the picture correctly with a brush, a camera or a pen, know something of the color of our weeds at different times of the year. True, our tree leaves change color so effectively that we can notice the difference miles away, but when a "white-topped daisy field goes marching up a glen" it tells you a mile or so away how the soil varies on either side. It defines the delta at the base of the gorge, and it tells you that it is early summer and not late fall. Furthermore, it tells you that you are probably in the East and not in the Middle West or the South. Other plants take the place of the daisy in these other regions and tell their story with equal vigor.

Many of our weed patch flowers would be in our gardens by our choice if we merely sought beauty. Do you know of any garden flower (Continued on page 332)

COMMON NAME SCIENTIFIC NAME	GREEN FOXTAIL GRASS Bottle Grass *Setaria viridis*	BARNYARD GRASS *Echinochloa crus-galli*	CRAB GRASS Finger Grass *Digitaria sanguinalis*	TICKLE GRASS Old-witch Grass *Panicum capillare*
DESCRIPTION	Height, to 3 feet, with a number of stems arising in tufts either directly or from sprawling bases and somewhat branched. Roots, fibrous but with a few main branches spreading horizontally through the soil. Leaves, to 10 inches long and to ½ inch wide, rather coarse, dark green and margined; sheaths, smooth.	To nearly 5 feet tall, although usually much smaller, forming either an open plant or a sprawling one sticking close to the ground. Leaf-blades, to 2 feet long and ½ to one inch wide. Sheaths of leaves, smooth and closely pressed to the culms. The whole plant appears coarse for a grass. Roots, profusely branching.	Height, to 4 feet, either erect or somewhat sprawling but usually creeping at the base and rooting at the joints where the soil is moist. Stems, slender and easily broken. Leaf-blades and sheaths more or less hairy with the blades 3 to 6 inches long and to ½ inch wide. Roots short and easily broken, "grubbed".	Height, to 2 feet, with stems erect or rising from curved bases, branching and spreading freely. Sheaths of leaves, densely hairy and the blades less so. Blades of leaves, to one inch wide, a foot long and relatively easily broken. Roots at the joints where these touch the ground but more commonly plant breaks.
RANGE	Throughout North America except in the far North, but a native of Europe. Has been naturalized wherever man grows temperate-zone crops. All kinds of soils either under cultivation or unused, in the open or shade; very common along roadsides.	In gardens, along roadsides, paths, barnyards, in fields, meadows and similar places but more particularly where there is a rich, moist, and relatively loose soil. Throughout the world wherever land is cultivated by man. Naturalized from Europe.	On cultivated ground and in waste places particularly where there is moisture, also in lawns. Almost world-wide in its distribution and common through most of the United States and southern Canada. Undoubtedly a native of Europe.	Common in sandy soils in fields and waste places, along paths and roadsides or in cultivated grounds such as gardens. Nova Scotia to Florida, west through British Columbia, and to Mexico. Established elsewhere; close relatives common.
RELATIONSHIPS AND LIFE HISTORY	Class Monocotyledoneae. Family Gramineae. Flowers in 2- to 4-inch spike suggesting a fox's tail, each flower being enclosed by 2 to 6 bristle bracts that are nearly ½ inch long and give "hairs" to the "tail"; these, more slender than in yellow foxtail. Pollination by wind. Flowers, July to September and fruits from August on. Fruits smaller than in yellow foxtail, under 1/10 inch long.	Class Monocotyledoneae. Family Gramineae. Flowers borne in open branching form but crowded thickly along the branches. Spikelets bear but one fruit or seed which appear in 3 or 4 rather irregular rows and are characterized by the little "spurs" that give the plant its name, *crus-galli* (spur of rooster). Pollination, by wind or self. Fruits about ⅛ inch long and rather conspicuous.	Class Monocotyledoneae. Family Gramineae. Flowers arranged alternately along 5 to 10 slender finger-like branches. Flowers, spikelets in pairs, under ⅛ inch long, 2 sterile parts enclose the fertile flower. Fruit, minute, light straw-colored, pitted and with cross marks and usually enclosed in the gray sterile parts.	Class Monocotyledoneae. Family Gramineae. Flowers in loose, open broom-like panicles looking like a feather duster. Flowers very small, pollinated by wind and producing each, one small shining brownish gray fruit. The fruits break loose from the panicle and drop to the ground. The flowers form from July to October and the fruits persist through the fall. Annual.
FOOD RELATIONSHIPS	Plant may be eaten by grazing animals either from fields or lawns. Supports a number of rusts and other fungus diseases. Air-dried material, 14% water; 50% nitrogen free extract; 19% fiber; 7% protein; 7% ash and 3% fat.	Serves somewhat as a ground cover. Fruits are eaten by chickens and by smaller birds and may serve a useful function in this connection. The vegetation is too coarse to be good grazing for domestic mammals but is eaten nevertheless. Some varieties used on certain types of land.	Has some forage qualities but quantity and quality inferior. About 67% water, 16% nitrogen free extract, 13% ash and crude fiber, 6% fats, proteins and albuminoids. Does not have many apparent insect enemies, but is host to a number of fungus pests also found on other plants.	Plant has a few insects that live in stems and some fungi that live on leaves but normally it is a healthy weed. Hairs and loose tops apparently make cattle avoid it and seeds do not persist in sufficient abundance in winter to provide dependable food for winter birds.
PROTECTION	Prolific as a producer of seeds which are long lived and may rest for years in soil ready to germinate when the opportunity presents itself. May occupy soil in which more useful plants cannot thrive and drive them out before they have the chance to get started.	Can be grown on flooded bottom lands better than some more valuable grasses and has been cultivated for this purpose. Indians of Arizona and southern California have used the fruits as food and consider the forage an excellent volunteer hay, particularly in its younger stages, for their animals.	Survives largely because of ability to root at joints and break leaving a portion in the ground. In moist season spreads quickly and occupies territory that might be used by other species. Pieces cut and scattered by lawnmowers take root and form new plants. Seeds long-lived.	The plant spreads itself by breaking off the part above ground and letting this act as a tumble-weed, scattering a few seeds at every turn. The seed-bearing parts are brittle and easily break off when jarred. The seeds are long lived and abundant as commercial seed impurities.
USE TO MAN	One of the worst grass pests, often ruining lawns which do not have frequent care. May be controlled in fields by fall plowing followed by disking and harrowing in spring and planting to corn which should be cultivated in mid-west at least 4 or 5 times. Serves as ground cover and to some extent as soil anchor.	The plant promises to yield useful varieties for forage that will grow under unusual conditions. This will probably center around lands that get flooded, and on which a quick-growing annual forage can be raised where perennials would be drowned out. Seeds, impurities in commercial seeds. Control by hoeing.	In the South, this plant may be used as hay where early forage is desired, but normally it is a pest that only cutting before maturity or careful hand grubbing will control. The fruits though small have a high nutritive value, and in Europe have been cooked in milk and served as a porridge.	The plant can be controlled by establishing a sod of other species. It is not a serious contender for space with most other plants and may then serve as ground cover, as shelter for small game and possibly as a not too ugly plant for fence corners. Mowing, hoeing and hand pulling will control the weed in gardens.

KNOT-WEED Doorweed *Polygonum aviculare*	SHEEP SORREL Field Sorrel, Sour Grass *Rumex acetosella*	SHEPHERD'S PURSE *Capsella bursa-pastoris*	PURSLANE Pussley *Portulaca oleracea*	COMMON CHICKWEED *Stellaria media*
Stems, to 2 feet or more in length but usually prostrate and profusely branched and radiating from a common, central, deep, white, woody, tough root system. Stems are pale green, ridged, tough, and bear at "knots" or joints clusters of pale green sheathing structures and elliptical blue-green leaves ¼ to 1 inch long.	To 6 inches or rarely more, but normally lower, with erect, tough, rather slender stems branching above. Leaves, mostly basal, on long petioles and with blades shaped like an arrow head. Roostocks, much branched, creeping, yellowish, tough and with tufts of rootlets at intervals.	To nearly 2 feet high, with slender, tough, sparsely and openly branching stems commonly recurving upward from a rosette at the base. Leaves, alternate and varying from slender, upper, clasping leaves to rather deeply-toothed basal ones, perhaps some distance up stem. Root, a deeply penetrating taproot.	Plant is prostrate close to ground, having a number of thick, rounded, easily broken stems from 3 to 10 inches long which commonly radiate from a central root system. Stems and leaves are succulent. Leaves small, dark green, thick, fleshy, rounded wedge-shape. Roots spring from a strong deep central taproot.	To nearly a foot high, with slender, weak, branching stems, which creep or ascend and have a fringe of pale, weak hairs down one side. Leaves, opposite, to about ½ inch long, on slender petioles with the lower leaves, and without these above. Forms loose mat that breaks easily leaving root system unharmed.
Cultivated ground, yards where soil is beaten hard, paths, waste places, between cracks in sidewalks usually in the sun. Wherever man is found in North America, Europe and Asia but a native of North America. Commonest mid-summer.	In fields, meadows and roadsides where the soil is acid or sour and where it is relatively dry. Found in all parts of North America except the extreme North and in other parts of the world. Naturalized here from Europe.	In gardens, roadsides, waste places, fields, and meadows, usually where there is good sun, and it is not too wet. Throughout the world wherever land has been cultivated by man. Naturalized from Europe and widely established in America.	Gardens and dooryards where the soil is loose, or where there are cracks through hard soil. Through most of North America where there is cultivated soil. Native of Europe but established throughout world where man grows crops.	In gardens, lawns, waste places, fields, meadows and woodland borders. Throughout the world where conditions are suitable, going as far North as the Arctic Circle. Was probably naturalized from Europe.
Class Dicotyledoneae. Family Polygonaceae. Flowers, small, greenish white with pink margins borne in axils of leaves from June to October. Probably self-pollinated, producing one seed per flower and going from seed to seed in a few weeks. Seedlings much like small plants, the seed-leaves being small and narrow. Annual.	Class Dicotyledoneae. Family Polygonaceae. Flowers either staminate or pistillate, the two kinds being borne on separate plants. The staminate flowers are conspicuously yellow and the pistillate, either mature or immature, are rather conspicuously red. Pollination by wind. Fruits, somewhat like three-sided spheres or broad spindles, brown and easily seen on the pistillate plants.	Class Dicotyledoneae. Family Cruciferae. Flower, small, relatively inconspicuous with stamens and pistils about equal in length, permitting self pollination when not effected by insect visitors. Flowers appear and function through most of the year, less conspicuous than the 3-cornered heart-shaped fruits, 2-celled, and crowded with seeds. A normal plant may produce 2,000 seeds.	Class Dicotyledoneae. Family Portulacaceae. Flowers, about ¼ inch across, solitary, inconspicuously yellow, 5-petalled, open only in bright sunlight from July to September, pollinated by bees and butterflies and producing from July to frost urn-shaped fruit capsules which bear many minute flat wrinkled dark seeds, which shake out. Leaves of seedlings about ¼ inch long. Axillary branches.	Class Dicotyledoneae. Family Caryophyllaceae. Flowers, small, greenish-white stars with five petals so deeply cut as to seem to be 10 and borne on slender stems. Flower through the year wherever there is a place where the snow has melted. Stamens, 3 to 7, and styles of pistil, 3 or 4. Fruits, egg-shaped and longer than calyx. Seeds, numerous, small, red-brown, rough. Self- or insect-pollinated.
The small dull brown, sharp-pointed, 3-angled fruits are finely ridged and appear in the diets of many ground feeding birds like minute buckwheat. It is commonly covered in late summer with a conspicuous white mildew that makes the whole plant appear to be gray.	The fruits are eaten to some extent by small ground birds and resemble minute buckwheat, to which the plant is closely related. The leaves are too sour to be favored by most animals but are eaten by chickens. Presence indicates subnormal amount of lime in soil.	Serves somewhat as a ground cover but is eaten by chickens and by some other animals. Has a mildly peppery taste which is not bad. The seeds are large enough to serve as food for some of the smaller birds while the whole fruits are commonly eaten by others.	Food to larvae of a saw-fly and a leaf-miner; harbors melon plant-lice and corn-root lice when cultivated host is not available; is also eaten freely by chickens, pigs and other animals. Has a white mold. 92% water; 3% protein and fat; 3% fiber and ash; 2% nitrogen free extract.	Serves as food for grazing animals where something better is not available. Chickens eat it. Seeds probably too small to be important as bird food. Plants relatively free of insect and fungus enemies. May serve as salad for humans.
The abundance of seeds produced, and their vitality, help the plant survive. The ability of the plant to grow in hard soil where others cannot grow, and to spread out and occupy territory, frees it from competition with others. The seeds are spread as impurities in commercial seeds.	Plant persists and spreads because of abundance of seeds and particularly because of the branching and creeping rootstocks. It can survive on exceptionally shallow soil and on poor soil but cannot well stand competition of other plants in rich soil.	Can withstand severe drying and cold, and because of quick growth and maturing properties quickly fills open ground unoccupied by other plants. The seeds may remain vital and dormant for many years buried or otherwise. Many rosette plants winter over and bloom in earliest spring.	Survives by abundance and vitality of seeds, and by resisting "weeding" by breaking apart and letting parts establish themselves. Seeds are probably spread as dust by wind. They are too small to be eaten by birds and are not present in winter. Seed to seed in a few months.	Can stand being frozen and so persists through year in any stage. With abundance of seeds, sprawling habit and general hardiness bound to spread. The seeds may remain vital while dormant for many years either buried or otherwise, and thus a supply is always ready to sprout.
The plant is a good ground cover for waste places but a pest along paths. Nevertheless it probably does help somewhat in holding soil, and serves as food for birds. One of the commonest of impurities in cheap commercial seeds.	Control either by fertilizing the soil to encourage competitive plants, by cultivation to destroy the creeping rootstocks or by using an iron sulphate spray. Seeds found commonly as impurities in many kinds of commercial seeds.	The plant is a common weed with some salad-making properties but always inferior to other plants collected as easily. Seeds common impurities. Hoeing which cuts the taproot or a spray of iron sulphate or copper sulphate serves as adequate check, and plant cannot survive competition.	Plant formerly cultivated for use as a potherb; may be used as a salad and pickled; tastes not unlike string beans. It has a slightly sour taste when cooked and in Mexico is even offered for sale in the public markets. In Europe a number of cultivated varieties developed for soups, salads and as greens.	The plant is excellent if cooked like spinach and tastes not unlike it. It may be a weed in lawns and gardens. Cultivation drives it from gardens. A spray of 100 pounds of iron sulphate to a barrel of water applied 2 to 5 times in the season will eliminate it from lawns where it may otherwise cause bare spots.

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COMMON NAME SCIENTIFIC NAME	ST. JOHN'S-WORT *Hypericum perforatum*	YELLOW WOOD SORREL Lady's Sorrel *Oxalis stricta*	SPOTTED SPURGE Milk Purslane *Euphorbia maculata*	ROUND-LEAVED MALLOW Cheeses *Malva rotundiforia*
DESCRIPTION	To nearly 3 feet tall, with tough, wiry, slender, stems, which branch towards the top and many of which may rise from a common base. Stems appear flattened. Leaves, opposite, smooth-margined and when held to the light show minute translucent dots. Leaves, to an inch long, usually light green and speckled. Roots, tough and strong. Runners.	Height, up to 1 foot with slender, pale green stems, which may root at the joints and be weak. Roots, woody or roots fibrous and finely branched. Leaves, alternate, long-stemmed, with 3 radiating, heart-shaped, deep or pale green leaflets with the notch at the outer edge, sensitive and quickly wilting when picked.	Sprawling with stems to a foot long and branched, finely hairy. Leaves, opposite, from ¼ to 1 inch long, finely toothed, with central purple-brown spot, finely hairy. Roots, rather deep and many branched but hardly coarse. The whole plant, roots, stems and leaves gives a milky juice when broken.	Height, to 2 feet but usually sprawling by round, smooth, branched stems. Roots, deep penetrating about depth the stems spread. Leaves, round-heart-shaped with rounded, toothed, 5- to 9-lobed margins, which are waved and with long petioles. Whole plant rather tough and roots and stems are not always easily separated.
RANGE	In fields and meadows and other waste places and particularly in pasturelands, from which it is not easily removed. Throughout Canada except in the far North and throughout the United States except in the far South.	Fields, roadsides, waste places, sidewalk borders, gardens, woodlands, usually where there is moisture. Eastern United States and Canada with related species to the west but not in northern half of Canada. Native of America.	Roadsides, paths, in crevices in sidewalks and waste places generally where the soil is relatively poor. Through North America except in the far North except for a few places. Native to North America but established in other parts of world.	Waste places, cultivated grounds, poor lawns but usually in relatively dry areas. Through North America except in the North. A native of Europe and Asia but widely established in other continents.
RELATIONSHIPS AND LIFE HISTORY	Class Dicotyledoneae. Family Hypericaceae. Flowers, yellow, crowded, nearly ½ inch long, rather attractive with 5 petals and a great tuft of stamens which are black dotted and more or less separated into 3 groups. Fruits, persistent small capsules filled with enormous numbers of small, cylindrical tan seeds, which shake out and help in perpetuating the plant.	Class Dicotyledoneae. Family Oxalidaceae. Flowers, yellow, about ½ inch broad, five-petalled, in clusters of 2 to 6. Pollinated by small bees, syrphid flies and even butterflies. Fruits, pointed cylinders which twist in maturing, expelling the red-brown seeds in all directions. Seed to seed in a few months. Seedlings, with small, egg-shaped, smooth leaves.	Class Dicotyledoneae. Family Euphorbiaceae. Flowers are whitish inconspicuous clusters in leaf axils. Both staminate and pistillate flowers are found on the same plant from June to October. Pollination by insects or sometimes self-pollination. Fruits, angled pods containing 3 4-angled gray, slightly pitted seeds. Seedlings, red and soon sprawling. Seed to seed in a few months.	Class Dicotyledoneae. Family Malvaceae. Flowers, five-parted with pale lavender or white petals. Stamens fastened together at base and at first enclosing the pistils, which emerge from the top of stamen tube. Pollination by insects or by self. Seeds formed in disc-shaped fruits, which are easily split into sections when mature. Flower, May-October; fruit, June to November.
FOOD RELATIONSHIPS	The juices are sour and blistering and make the plant unpalatable for cattle. Therefore the plants are left undestroyed in pastures. If cut as hay, the stems prove too tough to be eaten by cattle except as a last resort. Unwelcome in pastures.	Sour taste may make it distasteful to many animals; the seeds have been found in birds and must therefore be edible to them.	Relatively free from insect or fungus pests, apparently avoided by grazing animals probably because of the milky juice. This believed to be poisonous, since it will irritate skin, forming a red rash that soon turns into small blisters.	The green "seeds" are mucilaginous and are enjoyed by children as "cheeses" because of their sweetness. The fruits are also eaten by some birds, both domestic and wild. Few fruits destroyed by insects. Two flies live in leaves as miners.
PROTECTION	Protects itself by its enormous numbers of seeds and more than this by the persistent runners, which spread out in all directions and take over new territory for the parent plant. Has some artistic beauty but this can hardly compensate for bad qualities, particularly as flowers wilt quickly after being picked.	Seeds are shot from fruits for considerable distances to spread the species. Some plants extend themselves by runners and by rooting at the joints. The plant may act as an annual or as a perennial and so can survive varying conditions. It matures quickly and can survive a short season. It may produce seeds at any time.	An annual plant that reproduces by seeds that may lie dormant more than one year and which are produced in such quantities that they are probably present in most waste soil. The plants succumb to crowding by other plants such as occur when the soil is rich and otherwise suitable for cultivated plants.	Seeds are long-lived and may persist in soil for many years ready to germinate when conditions are right. The deep root system helps plant persist through drought.
USE TO MAN	Can best be controlled by hand-pulling, or if necessary by plowing the field under and using a well-tilled crop until the runners have been destroyed. The seeds are common as impurities in commercial seeds but are so small that they may easily be sifted out with any considerable care.	The plant is a weed in garden but succumbs to any reasonable cultivation and to crop rotation. The leaves may be eaten by children or may help in a salad where a mild sourness is desired. The seeds are found not infrequently as impurities in commercial seeds.	A persistent weed, which by maturing quickly may crowd out more desirable plants where they may be undernourished. Persistent hoeing and cultivation will control it but it is easier to enrich soil and let desired plants crowd it out. Serves as a cover for waste land but seeds probably too small for bird food.	Plant is reported to have medicinal properties. It forms a not unattractive cover for waste spots. Tender shoots are eaten as salad in Italy and France and the Greeks, Romans and Egyptians use the whole plant as a pot-herb like spinach. If the plants are young and are well cooked, they serve well in this capacity.

CATNIP Catmint *Nepeta cataria*	COMMON PLANTAIN *Plantago major*	BEGGAR'S TICKS Bur Marigold *Bidens frondosa*	DANDELION *Taraxacum officinale*	SOW THISTLE Milk Thistle *Sonchus oleraceus*
Height, to 3 feet, erect with spreading branches with opposite leaves, dark above and light beneath, downy beneath and with rather deeply scallopped or notched margins; leaves sometimes clustered close to the ground if the plant has been cut. Stems, square, stout, brittle to tough, downy, with longitudinal ridges and flutings.	Height, to 18 inches. Stemless, but with rosettes of leaves that are egg-shaped in outline, with 5 to 7 lengthwise veins and with long channelled petioles. The roots are strong and fibrous, springing from a thick coarse rootstock. The whole plant seems relatively coarse and tough.	Height, 2 to 5 feet with slender, branching, strong stems which are smooth or nearly so, purplish to dark green. Roots, shallow, branching and fibrous. Leaves, opposite, usually smooth, 3- to 5-lobed, sharply toothed on slender peticles, often rank; upper leaves, not lobed but sharply toothed, with rather slender pointed tips.	Stemless plants, with long, tough tap roots, which penetrate soil to depth of 4 feet. Leaves, all basal, 3 to 12 inches long, blunt lance-shaped, deeply toothed or lobed, forming permanent rosette close to ground except when surrounded by other vegetation. Juice, milky. Color, varying from light to dark green or reddish green.	Height, to 6 feet. Stem, smooth, hollow, light green, milky-juiced, angled, branched. Root, a tap root, white and fringed with fine rootlets. Upper leaves, somewhat triangular with clasping bases; the lower, with margins toothed and with weak spines; milky-juiced like the stem.
Roadsides, neglected grounds, and waste places, usually in rich soil. New Brunswick to Georgia and west through Quebec, Minnesota, Kansas and the eastern prairie country, probably still spreading. Native to Europe.	Common in lawns, fields, wastelands, roadsides and to some extent in meadows and fields. Throughout North America except in the far North but is a native of Europe and Asia and has established itself wherever man has lawns.	Low moist places, meadows, thickets, fencerows, woodlands and waste places where moisture is always abundant. Throughout the United States and southern British America. A native of America but established elsewhere in the World.	Lawns and waste places particularly where the soil is not too rich. Newfoundland to British Columbia and south through Virginia and Utah with less abundance throughout the continent and on other continents. Native of Europe.	Waste places, roadsides, gardens, fields commonly where ground is relatively loose. Throughout North America except in extreme North. A native of Europe but generally established in other continents.
Class Dicotyledoneae. Family Labiatae. Flowers relatively small, in coarse spike-like clusters at ends of branches; clusters, 1 to 4 inches long; flowers, small white or pale blue with purple markings in dots, insect-pollinated or self-pollinated, two-lipped with slightly swollen base. Flowers June to September. Bears four brown nutlets per flower from July through the winter.	Class Dicotyledoneae. Family Plantaginaceae. Flowers, tiny, greenish structures, closely set in slender spikes from 5 to 18 inches long. Flower May to September and fruit June through to December. Cross pollination assured by the stigmas maturing before the stamens. Pollen may be carried by wind or insects or by gravity. Seed, 8 to 18 per flower, sticky when wet. Perennial.	Class Dicotyledoneae. Family Compositae. Flowers in July and September in numerous bristly heads, each flower of center about ½ inch long and surrounded by leafy bracts but without ray flowers. One seed per flower. Fruits, flat black, wedge-shaped, ridged with two prongs each with backward pointing barbs. Seed to seed in a few months. Seedlings with 1-veined oblong seed-leaves.	Class Dicotyledoneae. Family Compositae. Flowers in dense clusters on the ends of a coarse hollow stalk a foot or more long. Pollination by self or insects but the pollen is sterile and no fertilization takes place though fertile seeds are produced. The fruits in clusters appear like loose white balls though individuals look like little parachutes. Flower all summer. Seedlings, spiny margined.	Class Dicotyledoneae. Family Compositae. Flowers, yellow and crowded 50 or more to a head in heads nearly an inch across, in summer and early fall. Fruits supplied with a downy parachute attached directly to end of fruit rather than to a stalk at end of fruit as in most wild lettuces. Fruits brown, somewhat flattened. Annual.
Not bad tasting, but cats are fond of it. Relatively free from insect or fungus pests. Composition, 94% dry matter; 63% nitrogen free extract and fiber; 22% crude protein; 13% ash and 3% ether extracts.	Serves as food for the larvae of 1 beetle, and 5 flies use the leaves for their mines. The seeds are picked from the tops above the snow in winter by some birds. The plant is 81% water, 11% nitrogen free extract, 2% fiber, 2% ash, 3% protein, fat.	Serves as food for the leaf-mining larvae of at least two flies, but is not commonly itself eaten by grazing animals even where easily available.	Flower heads support a few small insects like thrips. Cattle will sometimes eat the leaves, but do not choose them. Water, 86%; nitrogen free extract, 7%; protein, 3%; fat, 1%; ash, 2%. Goldfinches particularly fond of the fruits.	May be eaten by many domestic animals including pigs, chickens, sheep, goats, and horses, and supports a number of small insects that feed in the heads. 15% ash; 5% potash; 2% nitrogen; 2% sodium; 2% lime and 1% phosphoric acid.
The plant survives by production of enormous numbers of fruits and ability to survive cutting when not too close. Fruits are too small to be of any considerable food value to winter birds. Plants are apparently more common near dwellings than in wild places which may mean they do not spread widely and easily.	The weed spreads itself by its sticky seeds, because seeds are common impurities in seed mixtures and by getting an early start and crowding out possible competitors. Its seeds are very long-lived and persist in soil for years. The plant cannot survive competition with taller plants that rob it of needed sun, nor in rich soils.	An annual that spreads itself by the fruits, which break off and cling to passing animals, particularly sheep and dogs, or to the clothing of men. The fruits have been noted in the food of some birds and may because of this get a wide distribution.	Survives because of persistent perennial tap root, abundance of fertile seeds which are widely spread and abundance of suitable ground.	Persists because of easily broken rootstocks, and because of abundance of virile fruits that may be widely spread by the wind.
No value to man except that some are grown for production of oil used by government agents in trapping members of the cat family. Dried leaves and slender tops have had commercial value of 2 to 8 cents a pound for use in producing a mildly stimulating tonic. Control by close cutting and cultivation. Seed impurity.	The plant has been used in China as a potherb and is often used for spring greens in America. It may be controlled by cutting plants below the crown, salting the crown and persistent digging, but the best control is enriching soil so that competing plants can crowd it out. Does not survive cultivation.	Of no known value to man directly and often annoying as "stick-tights" on walkers' clothing. Flowers not unattractive. Sometimes troublesome weeds in the garden but usually may be destroyed by reasonable cultivation of the ground. Plants should be cut before flowering to avoid reseeding in gardens or elsewhere.	Beautiful flowers but leaves make inferior lawns. Control by frequent cutting, by encouraging other plants, by adding abundant fertilizers, by starving rootstocks with mulches, and by use of iron sulphate spray (100 pounds to a barrel of water). Leaves used as greens and flower heads in making dandelion wine.	Is used for greens and in soups in England and Germany and considered valuable. As a weed it yields to continued cultivation and should not be allowed to form seeds. Sheep will keep it under control. While some suggest its control by an iron sulphate spray, others contend that spraying is of no use.

(Continued from page 327) that can beat the color and the grace of the goldenrod? Blue sailors cost nothing and are prettier by far than some of the expensive rock garden plants. Can anyone seriously argue that sweet alyssum is any more beautiful than a dandelion, or that mignonette is, as it stands, more attractive than ordinary wild mustard? If it were not for the undeniable beauty of my New England asters, my little weed patch would have gone the way of the other weeds long ago. I give the regular flower garden a lot of back-breaking work, periodically, but I doubt if even with all that effort it can match the weed patch at its best. Surely there is beauty going to waste if we fail to recognize the value in weed patches.

Weed Patches and Agriculture

When we consider the role of weed patches in agriculture, we feel less kindly towards them. Many of the weeds serve as temporary hosts for enemies of our garden crops. Some of these enemies are insects such as the plant lice, squash bugs and grasshoppers. Others are fungus enemies of various sorts. Because of these many farmers have adopted the methods of clean farming. They do not give these plants the chance to support enemies of cultivated plants. If their only concern is the production of plants free from these enemies, they probably have been well advised. However, this is not all there is to the multiple-use agricultural philosophy.

Since many weeds produce fruits and seeds that may be blown by the wind for considerable distances, farmers and others have adopted the practice of cutting the plants before they have time to form mature seeds. Otherwise fields in the lee of a weed patch would become overloaded with weed seeds. Once certain seeds have matured, and have been shed from the parent plant, they may lie dormant for many years buried in the soil.

Weed patches provide forage of a sort to many farm animals. Even the wiry Russian thistle is eaten readily by cattle. Not all weeds are palatable or safe for cattle. The loco weed of western areas and ergot are dangerous. Some injure the pelts of sheep by clinging fruits; some affect the taste of milk; some are indigestible, and form undesirable cuds. But weed patches still have a positive value in some phases of agriculture.

Weed Patches, Soil Erosion and Water Loss

Weeds, of course, cannot provide a ground cover superior to clovers and the commoner forage grasses, but weeds are better than bare ground if one wishes to hold soil where it is, and to keep as much as possible of the rainfall where it reaches the ground. With a greater amount of water entering the soil, there is a greater reserve for time of drought, and weeds help water into the soil.

Many weed roots penetrate deeply and form passageways along which water may seep, thus penetrating deeper than would be possible through impervious soil.

When the weed root penetrates the soil it not only helps moisture enter the ground but it lets in some air. The oxygen in it has some effect on substances that can be oxidized. Soils that have been oxidized have been "weathered", which helps to make a valuable topsoil.

And still we have not exhausted consideration of the services rendered by those plants that are "just weeds". The roots of some plants penetrate deeply. Others sprawl horizontally and interlock with the roots of adjacent plants. This interlocking system serves efficiently to hold soil from washing. Soil is the most important part of a farm and anything that will help keep it, or store it, has value.

The ground cover our weed patch provides also serves to keep the temperature cooler in summer and warmer in winter. This means less loss of water by evaporation and more water available for use by the plants when sorely needed. Again we must admit weeds are inferior to the better cultivated forage plants, but are better than nothing.

So we come to weed patches in winter as they affect soil erosion. There will be shade under the weeds, where the snow will melt less rapidly. Snow that melts quickly, as it does when exposed to direct sun, may run off over the bank or may run rapidly off, taking some soil.

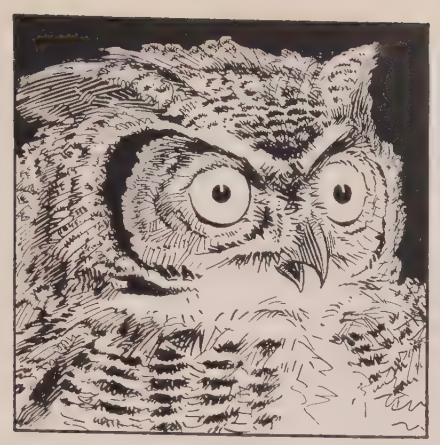
When some weeds stop snow from blowing in the wind, they do not stop it in its tracks. Rather the snow drifts on to adjacent territory before it comes to rest. This resting blanket of snow serves splendidly to prevent frost damage to the roots of such delicate cultivated plants as winter wheat. In this way, a weed patch with the tops still sticking up through a snow bank may help the wheat crop for the next year as much as it would damage the crop by rival seeds or by insect and fungus pests.

So we see that weed patches are rather important parts of our landscape after all. They give touches of beauty not necessarily associated with cultivated plants. They help to control temperature at and below the surface of the soil. They hold water. They let water get to the subsoil and they help weather soil into valuable topsoil.

These weeds of ours may feed our cattle and ourselves. They may yield a variety of medicines and some dangerous food elements. Unquestionably, they are responsible for the continued presence of such delightful birds as the quails, which most like to hear, but some like to shoot.

The story of how these weeds and the associated meadow plants may prosper or fail because of the presence of fertilizers in the soil, of how the prosperity of these plants may affect the whole prosperity of a state, will have to wait for another article. Little has been said about the encroachments these weeds make in our lawns, of the far parts of the earth from which many of them came and how they got here. Nothing has been said of the travels made to other parts of the world by our native species, or of the possible commercial returns that may come from a wiser use of the fiber of weeds to produce textiles and of the juices of some of them in making rubber or rubber substitutes. Still we hope that enough opportunities for a wider appreciation of weeds have been presented to make them inviting to the amateur naturalist. If this article leads a few of the readers of *Nature Magazine* to look twice at the neighborhood weed patches and to cease saying of the plants there that they are "just weeds", it will have served its purpose. What such a change in attitude may eventually produce is only a matter of speculation.

As We See It



LET'S BE SINCERE

Nature lovers wish to preserve animals for their beauty, their interest, their importance as members of the existing fauna, and for their sheer right to live. Sportsmen wish to assure hunting—an objective that certainly requires preservation of sufficient brood stock of the hunted creatures. Thus, so far as game species are concerned, it would seem that these two groups have similar aims and should be able to work together.

To anyone of experience in this phase of human activities, however, the bar to cooperation is obvious. The Nature lovers mean conservation when they say it; the sportsmen do not. Nature lovers believe that any threatened form of wildlife should be given the benefit of any doubt and that everything possible should be done to guarantee its perpetuation. Sportsmen, judging from their actions as a class, prefer to gamble with the fate of threatened species, being more interested in keeping them on the game list than in taking positive steps to assure their survival.

Attitudes of mind, both individual and group, have an important bearing on the conservation of wildlife resources. Too often we do not give them enough study to discover the reasoning back of them. Yet, if we are to be honest with ourselves in meeting conservation issues, we must consider intellectual integrity. This editorial, contributed by one who has been a long and careful student of the whole subject, represents, in general terms, such an honest appraisal. It will be followed in succeeding issues by more specific discussion of facts and factors in the conservation field.

The result of such gambling is clear; practically all animals that white men found on this continent and which are now extinct were kinds that were killed for sport and for food. Similarly, nearly all that are now threatened with extermination have been brought to that peril by hunting and trapping. In the light of the incontrovertible record, it seems to Nature lovers that instant steps should be taken that can not fail to save these vanishing creatures. But hunters and trappers, although equally aware of the record of exterminations, scarcely relax the grip that is forcing additional species into oblivion. Sportsmen have exterminated one race of mountain sheep and they are now killing off all the others as fast as may be under the rules for killing, which they fondly refer to as conservation measures. Even on reservations where an attempt is being made to safeguard remnant herds, poaching is the worst menace to success.

The elk in various states, the moose in Wisconsin, and the woodland caribou in Minnesota have been extirpated during the era of state "conservation" departments. Reintroductions have been made in such cases, often with success, but they do not palliate the original violence to Nature's order, nor can they ever restore the extirpated forms. The heath hen was killed off over most of its range by sportsmen, and used up in its last stand by poaching and burning of its range. All races of the related prairie chicken group are in danger, Attwater's prairie chicken in Texas now being on the verge of extermination.

The disastrous effects of the sportsman's paradox of using while conserving is not confined to local instances. They are plainly evident in the national conservation program which embodies the same doctrine because it is controlled by sportsmen. The woodcock, so reduced over 90 percent of its range that it has long been classed as a vanishing game bird, is being remorselessly forced to its doom. The jack snipe, of which not one individual can be seen now to a hundred a quarter of a century ago is still legally huntable and no sportsman seems to be worrying about its fate.

Among waterfowl, all of the less numerous species are being shot and still further reduced, legally or illegally, because the average hunter is so poorly informed about the game he kills as to be unable to distinguish them. Thus it is alleged that we cannot protect the redhead because of its resemblance to the canvasback, a species which, though itself greatly reduced, is such a favorite with gunners that it cannot be given up. Ross's goose, a miniature of the snow goose, cannot be protected, it is alleged, without closing the season on snow geese, which reigning conservationists say is unthinkable. Tentative protection of certain species has been dropped because of the difficulty hunters have in distinguishing them, and now for the same reason it is planned to restore the wood duck to the game list although the numbers of that species have long been dangerously low.

Such things clearly indicate insincerity in conservation intent. If sportsmen really meant to preserve a species from extermination, they would not hesitate to require, for pos-

session of a hunting license, the ability to distinguish protected as well as huntable species in the field. If preservation of all species of American wildfowl were their real goal, they would gladly cease killing snow geese, for instance, to protect Ross's goose, and, immediately upon the appearance of any danger sign place a threatened species on the protected list and keep it there. They would not continue to rely on the happy-go-lucky theory that maybe this and that scarce species will somehow persist even though it is kept on the game list. If sincere, they would make sacrifices, take any steps necessary to insure that threatened species shall be preserved. They have always taken chances, but at the risk of wildlife, not of their cherished sport. An individual quail hunter shoots half or more of a covey of the birds and plumes himself on "leaving some for seed". These birds combine with other shattered flocks to make new coveys, and along comes another gunner, probably also calling himself a conservationist, who shoots down the new flock and "leaves some for seed". The fact is that hunters have never known, nor until very recently have sought to learn, the numbers of game species in the wild, nor honestly attempted to regulate the kill according to those numbers. They have not cared, and they still do not care, enough for even the hunted species to make sure of their perpetuation. They have trusted to luck. Nature lovers cannot work with people who, regardless of their piously phrased intentions, continue to kill, whatever the effect may be upon the hunted species. When spouting conservation, whether in ignorance or otherwise, sportsmen simply do not mean what they say.

Unfortunately, this devil-may-care attitude on the part of those who should be the most interested in sparing the creatures that furnish them sport may be passed on to governing bodies, state and federal. This intensifies the danger that arises from the attitude of mind we are discussing. The pernicious result is all too plain in many sections where concentrations of game species may make hunting a major business. Unlike mining and lumbering, which are dependent on local supplies, the hunting of game, especially of migratory species, tends to be continued in response to the gambling lure. The more numerous the gunners, the greater their power. Restrictions are effectually resisted; closed seasons become impossible; the game may all but disappear. Thus the insincerity of the selfish gunner finds its greatest field for harm.

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"Generally satisfactory" is the bedside report on the condition of our American waterfowl rendered by Dr. Ira N. Gabrielson, Chief of the United States Fish and Wildlife Service. Precisely the same report was rendered to us recently by the attending physician to a friend in the hospital. The friend passed away two days later.

Dr. Gabrielson's report is based upon a nationwide inventory of migratory waterfowl resources made in January. This revealed an estimated continental population of 70,000,000 waterfowl, double the pitiful estimate of 1935 and only slightly larger than the 1940 inventory of 65,000,000. Gains were not uniform geographically or among species. Gadwalls were reported to have shown the greatest increase. Redhead and ring-necked ducks showed considerable decreases. Both of these birds, then, still face the spectre of extinction.

In analyzing the situation, Dr. Gabrielson points out that there has been a marked leveling off in the upward trend in waterfowl numbers. Furthermore, he asserts that "under the regulations in effect for the shooting season of 1940 the sportsmen came perilously close to a complete harvest of the year's crop of wildfowl." We note also that duck stamp sales show a doubling in the number of hunters during a six-year period. Therefore we have no more ducks per hunter than before.

Pointing out that the hunting regulations were liberalized in 1938, and again in 1940, Dr. Gabrielson says that "it appears that we have about reached the limit of such action if we are to continue steadily toward a goal of adequate restoration of this highly important natural resource."

Inasmuch as progress toward such a goal seems definitely to be halted, with certain species in precarious state, it is plain that liberalization is not only totally unwarranted but may well have been ill-advised. Conservationists and enlightened sportsmen should sustain Dr. Gabrielson in regulations calculated to carry us forward again toward migratory waterfowl restoration.

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H. R. 3778 is the number of the pure streams bill introduced in the House by Congressman Karl E. Mundt for the Izaak Walton League of America. This bill should have the support of all conservationists—organized and unorganized—who wish to see a start made toward pollution control. It is a simple and fair measure; leaning over backwards in view of the existing emergency; liberal in its provisions for cooperation on the part of industries and communities. Those sincerely wishing to see the deplorable condition of our streams corrected will support this measure. Those interests seeking selfishly to prevent correction of the situation will be found supporting H. R. 1110, the so-called Spence Bill, which is the latest of the recurring measures that seek to postpone regulation by "further study" of the subject.

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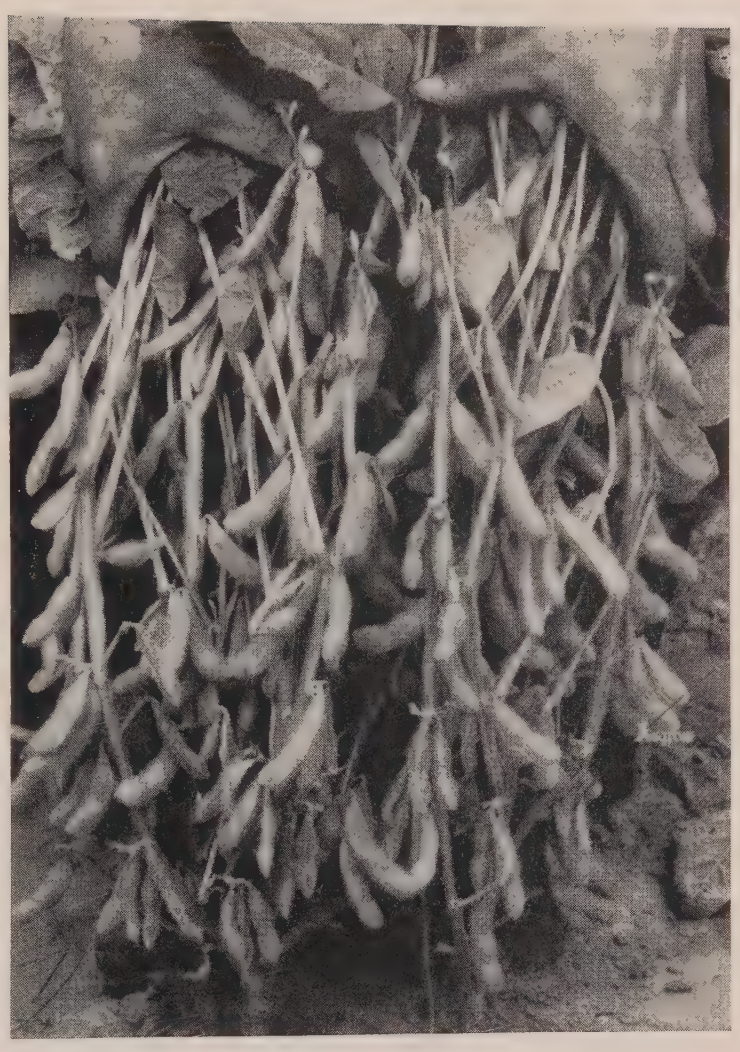
We note with interest—and some regret—the publication of "Sixty Educational Books of 1940", a list compiled with the aid of more than 250 specialists in various fields of education. This list appears in the April, 1941, issue of *The Journal of the National Education Association,* and our regret arises from noting that nowhere is there mention of a book on conservation. There are several recent conservation books, and this is a subject that is fundamental to the future of America and, therefore, fundamental to the educational system. For some reason those in authority in the field of education choose still largely to ignore the subject, or to give it little thought.

CELESTIAL BEAN

By ANDREW S. WING
Garden Editor, Nature Magazine



TWO HANDFULS OF SOYBEANS
The new edible or garden type is prolific and makes the most of soil and climate. It is resistant to disease and insects. Photograph from Associated Seed Growers

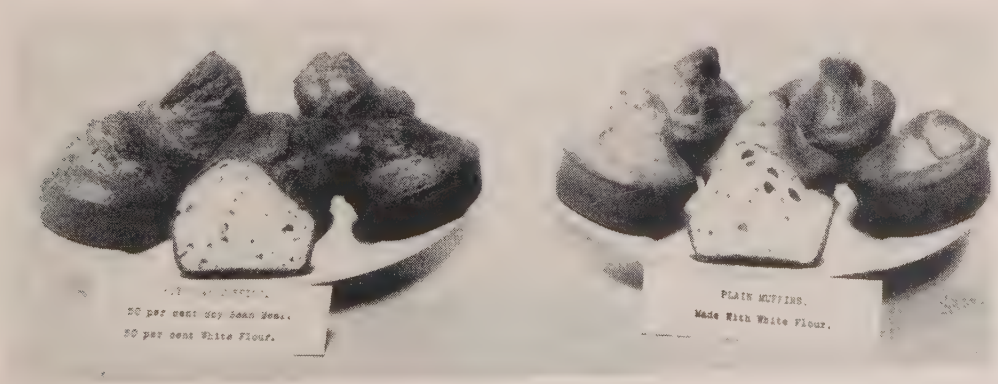
INTO the American farm scene has come a plant immigrant from the Orient. This yellow fellow with a round, poker face and slant eyes has been slyly slipping around, as is the supposed habit of Orientals, until through sheer force of numbers, ability and versatility he has put over a bloodless revolution on some of our leading farm crops, and is threatening others.

His official name is *Glycine max,* but he is familiarly known as soybean, although he may go under the aliases of soya or even soja. In height he ranges from a little more than a foot to six feet, although his tribe averages from two to three feet. Although generally upright in habit, he sometimes stoops to conquer. His short brown pods, which hang down close to the stem, are full of fruit of incredible richness and versatility.

Even though you may never have met him in person, this fellow from across the Pacific is entering your life—even your stomach—without your being the wiser. Your breakfast toast may contain soybean flour; your bacon may come from soy-fattened hogs. The salad oil you use at lunch; the nuts you munch at teatime; the soap you use; even the rayon underwear you have on; all these may derive from the humble soybean.

If you drive a car some of the plastic parts, and perhaps the enamel, contain soybean meal or oil; while the white line on the highway you carefully avoid very likely is soybean paint. The pie or cake you eat may contain a cooking fat made in part from soybean oil; and even the dog food you give old Shep is pretty certain to have soybean meal in it. In a Chinese restaurant, of course, you cannot avoid eating such delicacies as soybean sprouts, curd (or cheese), and the sweetish-salt sauce that always accompanies such food. Indeed, almost all of the famous meat sauces on the market, I am told, have soy sauce as a base. I heard of a new use just today—soy flour as a substitute for pollen for bees. But why go on? Let's get a little better acquainted with this friendly brown fellow as he is before the processors start to work on him.

Although the soybean is a comparatively recent crop in the Western World, it has been a staple in the Orient for



SOYBEANS ON THE TABLE
At left, muffins made from mixed wheat and soybean flour; right, made from wheat flour. Soybean flour may thus be used successfully in bread, cookies, cakes and such, usually with one fourth soybean flour to three fourths wheat flour. Valuable vitamins, and protein and calcium values are thus combined. Dept. of Agriculture photograph

thousands of years. The first recorded history is in a Chinese medical book of 2838 B.C., written by none other than the Emperor Shen-nung. Even the name is of obscure origin. The Chinese call it "Shi-Yu"—"Shi" meaning the salted bean and "Yu" referring to the sauce or condiment. It did not, however, appear on the European scene until introduced into France in 1740. In 1790 it crossed the Channel into England, and in 1804 it was brought to these shores, where it remained a botanical specimen for almost a hundred years. About the turn of the century, farmers in the mid-West began to wake up to the potentialities of the soybean as an American farm crop. My father began growing soybeans in Ohio more than thirty years ago, and a ready sale was found for the seed. The varieties then were limited to half a dozen, derived from introductions made by the United States Department of Agriculture. We simply selected the strains best suited to our corn belt soil and climate.

A TYPICAL SOYBEAN PLANT

There are several strains of soybeans with varying habits and size of growth, some of them upright and some drooping. Dept. of Agriculture photograph

There was no great market for the soybean then, except for seed, as its industrial uses had not been discovered, and it was at a disadvantage compared with corn, oats and other crops because of the difficulty of harvesting it. The combine harvester was then unknown except on the great wheat ranches of the West, and the soy had an annoying habit of shattering badly if handled by the usual cutting and threshing method. Because it was a legume that added nitrogen to the soil, instead of robbing the land of fertility, it was valued as a soiling or green-manuring crop, but it did not attain real popularity until about 1926. Then Glen McIlroy of Ohio, now president of the American Soybean Association, and other good farmers, discovered that the soybean could be profitably harvested by the combine method. Since then the acreage in Ohio, Illinois, Indiana, Iowa and other states has gone up steadily until the bean has crowded ahead of oats and is even threatening cotton and other crops as an export item.

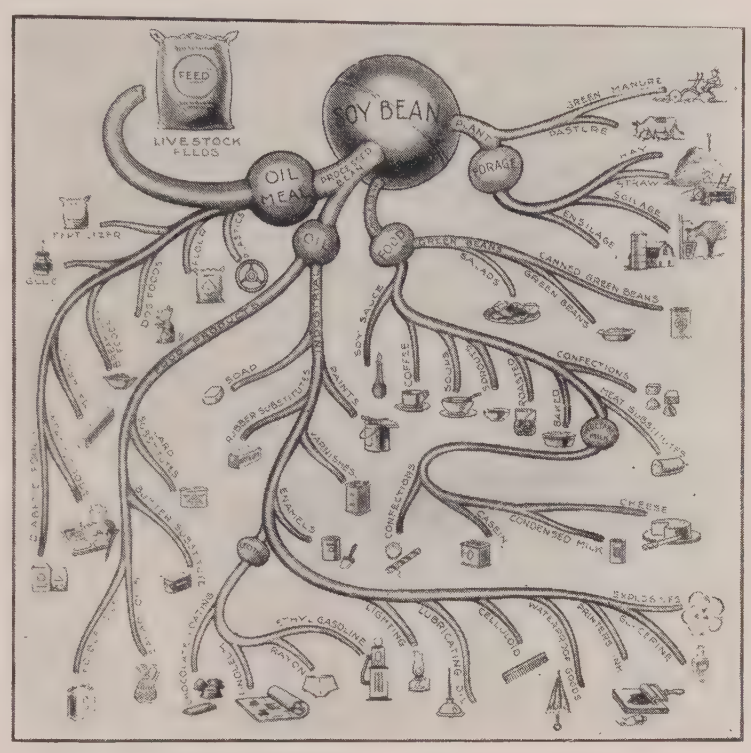
But it has been even more recently that we have awakened to the food possibilities of the soybean. I well recall attending a convention of the Soybean Association at which soybean products were served in various forms. Some were good. Most of them were "edible", but unless disguised in some form or other, they were not very appealing to anyone who was not a soybean addict. There is, unfortunately, a rather bitter or rancid taste about the oil. When the oil is extracted, the cake or meal is heated, and the resulting product has a rather dry, peanut flavor. Still further processing results in disguising the product until one is unaware that he is eating soybeans.

There are a number of advantages to the use of soybeans for human consumption. They are rich in protein and calcium. They are much more economical producers of both fats and proteins than the hog. The German army today, for instance, is said to be existing to a considerable extent on meat substitutes that have soybeans as a base. Dry soybeans are rich in B vitamins; fair in vitamin G content; contain varying amounts of A, D and E. The green beans are a good source of vitamins A, B, C and G. Soybean sprouts are well supplied with C vitamin. In the Orient, natives who supplement a diet of rice with soybeans, do not get beri-beri. The proteins in soybeans are rich in amino acids, those mysterious substances that are now considered so essential to bodily welfare. People who are allergic to meat or milk proteins can often assimilate soybean products without difficulty, making them valuable in a diabetic diet.

I came home from that soybean convention determined to give them a thorough trial. A two-bushel bag of the ordinary field beans was obtained from the home farm in Ohio. We tried cooking them in various ways. They were pretty good baked, but took much longer to cook than ordinary beans and never did become very tender. However, with plenty of catsup or chile sauce, they were quite edible. We tried but never did learn to roast them properly. From various official sources I wangled enough seed to plant several rows of edible soybeans in the garden. These did very well, although they were later in maturing than ordinary garden beans. The pods are smaller than lima beans and contain fewer beans, but the contents are tasty and much like the lima in flavor. We liked them, but found them rather light yielders. Also the pods are hard

to shell unless they are boiled first, an easy thing to do. The Chinese serve them boiled whole, eating them directly from the pod, which is a bit slow but can be done.

There are now several varieties of edible soys listed by American seedsmen, the principal one being the Bansei. Other varieties suited to our conditions, according to Dr. W. J. Morse, who is the U.S.D.A. expert largely responsible for their introduction, are Aoda, Chusei, Emperor, Funk Delicious, Giant Green, Higan, Hokkaido, Imperial, Jogun, Kura, Sousei, Tastee and Willoni. One or more of these varieties is well worth a trial in any garden. The culture of the soybean is easy, as they are more resistant to extremes of temperature and moisture than the ordinary garden or field beans, demanding only a fairly fertile soil that is not acid. In the field they will produce about half as many bushels per acre as corn—that is to say, you can expect thirty bushels to the acre of soys from land that will grow sixty bushels of corn to the acre.



VARIED USES OF THE SOYBEAN

Research has discovered many places for it in our economy. Diagram courtesy of the Decatur, Illinois, *Herald and Review*

As a garden crop they are destined to be useful in regions heavily infested with the Mexican bean beetle, that recent pestiferous insect that has made it such a nuisance to grow good string beans without continual vigilance with a sprayer or a dust gun. The Mexican bean beetle does not like our little brown friend from the celestial kingdom. He will ravenously devour a row of garden beans, venture over to a row of soys alongside, browse on a few leaves, and move on to parts unknown. The edible soy deserves a trial in every garden in the territory infested by this woolly Mexican pest.

Plant breeders doubtless will in time make improvements in the edible soy, in earliness, productivity, ease of shelling, and in tenderness and flavor, just as considerable progress has been made in the improvement of the field beans. There is also the probability that there are many desirable varieties in distant provinces in China, Manchukuo and Japan, where superior varieties are blushing unknown to Occidental gardens. The soybean is a self-pollinated species and not so easy to improve by scientific breeding as open-pollinated plants.

Considerable time might be saved in the development of better varieties for American farms and gardens if it were possible to explore thoroughly Manchukuo and other countries where the soybean has been a staple farm crop for countless centuries. Because of the war in China this is not easy. Also, the Japanese do not welcome plant explorers who are looking for strains that will make it easier for our farmers to compete with them in one of their major export items. We used to import vast amounts of soybean oil and meal. We still import a good deal, but since our own production has increased so rapidly, American growers are becoming more and more jealous of the home market.

Thus the soybean has been drawn into the vortex of the vast struggle for world-wide economic supremacy. The "Great Fat Fight", as it was once called by Herbert Hoover, is too complicated to consider here. It is interesting if you care to go into it, and very important. It all comes down to a struggle for supremacy between domestic and foreign producers of the oils from which cooking fats, butter substitutes and soap are made. Cocoanut oil comes in over a tariff from the Philippines and a thousand other islands to compete with soybean oil, cottonseed oil, corn oil, lard and other products of our own farms.

American farmers, naturally, do not like this foreign competition but are powerless to stop it altogether. Meanwhile, our farmers are waking up to the fact that they are competing with each other to a greater and greater degree. You raise corn and fatten pigs. I grow soybeans for market. Your lard competes with my soybean oil. The cotton farmer competes with both of us, and we all compete with the man who makes beef, or who sells butterfat. If one lived in a place where it is possible to produce all these products on the same farm—parts of Missouri, Arkansas or Texas, for instance—he might get all balled up trying to figure out which group in Washington he should support, or whether he should buy products made from soybean oil, cottonseed oil, corn oil, lard, or beef tallow!

The large processors of soap, cooking fats, salad oils, and butter substitutes are very versatile and can switch from one fat to another according to which is the cheapest, but prefer to stick to one formula. Millions of dollars have been invested in soybean processing plants in Decatur, Illinois, and in other (Continued on page 349)

ALLEGHENY COLLEGE LIBRARY

LOOKING AT THE FACE OF THIS COYOTE, WITH ITS CALM AND INTELLIGENT EXPRESSION, WE CAN UNDERSTAND THE FEELING THAT LED AMERICA'S FIRST INHABITANTS TO GIVE THE ANIMAL A HIGH PLACE IN THEIR REGARD

Photograph By J. C. Allen

THE WONDER DOG

By W. B. CONGER

Once upon a time in the long, long ago, the Dog of the Dawning was a god. Those were good days for him, as well as for all animals, days when his eyes held the light not only of affection but of trust; he was free from fear, from hunger, and was beautiful. No one harmed him, for all loved him and held him in high honor for his wisdom. In America, then the land of the Indian, there were no bank accounts.

The Indians believed the Animal People were on earth first. They held them all as brothers, some as ancestors, some as gods. The Nahuas gave Coyote a temple of his own, having a congregation of priests devoted to his service. His image was carved in stone, and when he died an elaborate tomb was erected in his honor. To other Indians he was a hero, saving the human race from catastrophe by his wit and quickness. He gave them light and heat by day by hanging the sun in the heavens, night being caused by the Spirit Chief putting it under the shadow of his robe. Coyote was also intercessor between god and man for they held he was a wise guide for man. The Animal People knew no fear; none were ever wantonly killed.

Possibly the imagination of the Indian was stirred by Coyote's own peculiar song. His paean to the rising sun stirred a responsive chord in the Red Man's breast. There is, it seems, among a medley, "one note uttered toward dawn, a long smooth sound of truly musical quality, something like the fluty call of a loon to its mate." The evening song is more riotous, sung shortly after sunset as a greeting perhaps to the stars, which he created, and is described as a series of short barks, increasing in power and pitch until it changes to a long squall with weird ventriloquial effects:

"I'm a baritone soprano; and a base and tenor, too,
I can thrill and slur and frill and whirr and shake you through and through."—Seton.

He does not gather as he did on the prairie, for he is scattered far and wide. Yet he still sings his operatic airs, in smaller numbers, in other places, for he is yet the ecstatic little wolf of the prairie.

Yet, while fully appreciative of his own efforts, he does not like the white man's musical instruments. Bare Ribs, so named, we are told, from her hungry puppyhood due to the death of her parents, used to lock both legs about her master's knees and lean her little head against him and howl with all her might when he played the violin; and when a certain uncoyotelike tune was played upon the piano, she ran out of hearing of the hateful sounds.

Some authorities believe that the Wonder Dog sings not only for pleasure, but to tell of opponents, to warn of danger, to ask for information and assistance. It seems a leader will mount a lonely butte and proclaim his orders over the silent prairie, which are repeated to other coyotes at a distance and within, it is said, a fraction of

a minute, most of the coyotes within a radius of miles have received the latest news and orders.

Like the larger wolf, he mates for life, and he and his wife live and hunt, play, run, work and perhaps sing together. Food is an important item to such an active creature. Men whose sheep crop the grass to the roots and lay waste the public ranges, condemn the coyote because he, under certain conditions, also destroys; but sheep and poultry adequately protected are untroubled by him. There is no food, nothing too fresh or too ancient that a coyote will not eat to fill his hungry stomach. When great herds of animals passed in days gone by, he picked clean the carcasses, slew the diseased, thus saving the air and water from pollution, and he does the same today in a more limited way. Unprotected and unfed cattle that die from freezing and starvation, sometimes by the thousands at a time, are disposed of by him. He outwits other animals besides man and often gets a tidbit or a good meal by using his brains. Those who like his clever ways say he is like a bright pupil in a class. He can "play dead" with a convincingness surpassing that of the opossum. Alert, cunning, skillful, a wag, he not infrequently metaphorically points the finger of scorn at his arch-enemy, and has earned for himself, among other names, that of Clown of the Prairie. He has never harmed a child and in this he surpasses even the cougar, which is said to have once attempted to carry away a baby, and is believed to have killed one child, although there were no eye-witnesses to the deed. His tribes, as with the larger wolves, have suffered in reputation as sheep-killers, when much of the killing has been done by unfed dogs. Coyotes do not quarrel over food, but each helps himself to that which another has provided. This little animal, when not interfered with, has helped to keep the balance in mice and rats, the attractive chipmunk, the busy gopher, and other small creatures, hares, lizards, the jackrabbit, the prairie dog:

"At least a thousand prairie dogs I've fattened on, you see,
And every bark they had in them is reproduced in me."—Seton.

Where the coyote has been hunted by Federal agents, the jackrabbit became so numerous that it took ten percent of all crops suited to its food habits. The slaughter of the jackrabbit within the last two years was so repulsive as to cause public indignation. On many occasions children have been encouraged to assist in the destruction of penned rabbits by clubbing the terrified animals to death. Such training in cruelty will surely result in more harm to the community than any losses from the rabbits.

A recent report as to the coyote's usefulness to the rancher and farmer, covering a period of three months—1697 stomachs being examined—is as follows (percentage by bulk): carrion, 36; rabbits, 34; rodents, 15; domestic sheep and goats, 8; deer, 3; birds, 3; poultry, 1; game, 1; others 1; wild fruit, 1.

PHOTOGRAPH BY A. G. PRILL

THE AFFECTION AND DOCILITY OF YOUNG COYOTES MAKE THEM THE FAVORITE PETS OF THESE OREGON RANCH CHILDREN

Like the rest of us the Wonder Dog is loved and hated, trusted and misunderstood. Those who have no desire to kill him tell us he is a brave and kindly creature to his own, and gladly gives his "bright friendship" to those who will let him.

He has been called a coward by those who hate him, because he runs from the creature with a third arm that kills, as Bambi and Perri know so well. Like the rest of us he runs from an angry bull, an enraged stag; also, from a pack of dogs all larger than himself. Locally, trained Russian wolf hounds have been introduced to run him down; some who object to the bull fight may term this "sport."

When he finds he can run no longer he turns and puts up a fight of which any one could be proud:

"Then the pack was upon him. The men on horseback saw a scramble of yellow, bleeding hounds and now and then one bloody, shaggy demon, green-eyed, slashing here and there. Then they could see him no longer. They parted the dogs; there lay a mangled piece of yellow fur—and two dead fox hounds. The remainder of the pack was sadly slashed and torn. 'I'm glad to see that sneakin', dirty, worthless, four-flushin' coyote killed,' said a horseman. 'I didn't think them hounds could do it.' The owner of the hounds looked quizzically at these native huntsmen. Then he surveyed his torn and depleted pack. He picked up the thirty-pound coyote. 'So that is what you call the cowardly coyote,' he said."

Nearly everything that is destroyed can be built up again after a fashion; but when life is taken there is no return. If a humane attitude toward animals is one of the gauges of civilization, cruelty in the moving pictures, the tortures of the fur industry, the extermination of a species by individuals or by a people, will preclude our qualifying as completely civilized. If culture is at once the enlightenment of our intellectual and esthetic nature and is "the intellectual content of civilization"—we fail.

Perhaps it is that our sense of values is wrong. The Buddhist has said that Christendom is the hell of animals.

Conservation Comment

No presently conceivable emergency could possibly justify the relaxation of hunting restriction to provide emergency-time food supplies, declares Ira N. Gabrielson, Chief of the Fish and Wildlife Service, commenting on an announcement from England that "such delicacies as badger hams, bear steaks, roast python, and hedgehog" are being suggested as dietary additions. Some suggestion is bound to appear in this country, more than likely originating with those who would like more shooting liberties rather than from those sincerely feeling that such items on the menu would be toothsome or are needed.

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On 70,318 acres of California land operated on a game management basis, 7008 quail and pheasants were released and these acres were opened for 1940 shooting. There were 2369 birds killed, this being 33.8 per cent of the liberation, although the regulations permitted an eighty per cent harvest. According to the announcement a "vermin control" campaign was carried on in connection with these restocking activities, coyotes, wildcats, skunks, coons and hawks being killed.

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An increase in the area of perpetual forests to provide a substitute for public aid in hundreds of communities is urged by the National Forest Reservation Commission in its annual report to Congress. Pointing out that one-third of the nation's area is most valuable when forested, the Commission asserts that the self-support of people and communities has suffered as timber and other resources have been removed. Efficient forest management and maintenance of forested areas will greatly remedy this condition, it is urged.

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It is a pleasure to report that Bob White will remain on the song bird list in Ohio for another two years at least as a result of the action of the Conservation Committee of the Ohio House of Representatives in refusing to report favorably a bill that would have permitted the shooting of quail. The bill was supported by the League of Ohio Sportsmen, and was opposed vigorously by farmers, Nature groups, women's organizations and interested individuals.

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Perhaps we are just naïve, but we had gathered the impression that the duck hunter's greatest thrill came from proving that he was a marksman able to hit a moving target. That does not appear to be the case with six North Dakota gunners, one of whom writes to North Dakota *Outdoors* as follows: "I was out with five other fellows from Hazelton this fall (1940) and we killed fifty ducks in one hour with only twenty-one shells. We were hunting five miles east of Hazelton on the Stanton creek. We came over a hill and started shooting. We did not have to aim because all we could see was a black cloud of ducks in front of us. Forty-six birds were dropped on the ice in the creek as a result of the first barrage. I walked over the hill and killed four more in one shot." This, we gather, comes under the head of sport shooting.

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During 1940 the Wisconsin Conservation Department planted 38,106,300 young forest trees and increased its forest lands thereby to the extent of 20,000 acres. This brings the total of non-federal public forest area in the state to 2,079,000 acres. The five state forest nurseries are now established with a capability of supplying fifty million new trees annually, enough to reforest 25,000 acres.

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Unquestionably one of the greatest assets of western North Carolina's mountain region is its annual floral display of laurel and rhododendron. This each year attracts visitors from far and wide and has made the region into an outstanding resort section. This, in fact, is its greatest source of income, and is an asset to be guarded jealously. It is, however, threatened to a degree that may well become dangerous. At Boone, North Carolina, a new manufacturing concern is turning out smoking pipes. It formerly imported briar wood for these pipes from Italy, Algiers and France. This supply being cut off, the company has found that laurel and rhododendron burls supply as good wood. This has started an assault on the local supply, even within the boundaries of Pisgah National Forest. Indiscriminate gathering is the result, promising the destruction of floral wealth. The pipe concern provides income for thirty workers; the tourist and resort business for thousands. The local chambers of commerce should awaken to the threat, and some means should be found for carefully supervised gathering of material to the end that it would result only in the thinning of existing plants.

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The texts of all Federal laws relating to the protection of wildlife have been assembled in one pamphlet by the Fish and Wildlife Service of the Department of the Interior. This is Wildlife Circular 12 entitled "Text of Federal Laws Relating to the Protection of Wildlife", and is available from the Superintendent of Documents, Washington, D. C., for five cents in coin.

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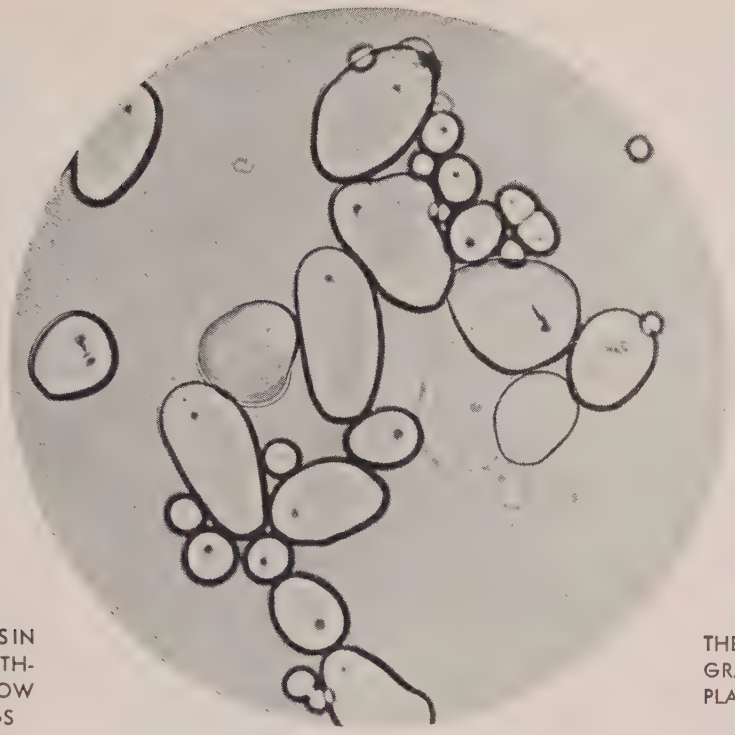
Careers in Forestry is the twenty-first in a series of occupational monographs brought out by Science Research Associates, 1700 Prairie Avenue, Chicago. It is written by Charles N. Elliott, forester and former Conservation Commissioner of Georgia, and discusses the various phases of forestry work now open to trained men. Copies are available at fifty cents each.



POTATO STARCH OCCURS IN LARGE GRAINS. AS IN OTHER STARCHES THEY GROW IN CONCENTRIC RINGS

THE FORM OF THE STARCH GRAINS VARIES WITH THE PLANT. OYSTER-SHAPES ARE IN POTATO STARCH

DO PLANTS EAT?

By EVELYN WOLCOTT

"WELL, not exactly", would be our answer to the question in the title. Plants are not animals, but they do have to have food. This is not the stuff in boxes labelled "plant food", however. That is simply fertilizer. They have to have sugar, starch and oil for energy, and protein to build new tissues, and they feed themselves.

Plants make the only food there is. The green leaf is their food factory. It has thousands of workrooms with transparent walls, and many "doors" called stomata to admit air into its spacious hallways. There is carbon dioxide in the air, as you know, and that is fortunate for us, because without it we could have no food.

As the air circulates in and out of the leaf through the open mouths (stoma means mouth), some of it dissolves in the film of water on the cell walls. Immediately carbon dioxide particles begin bumping into the walls. If there happen to be fewer carbon dioxide particles on the inside than there are on the outside, they bump right on through as easily as Alice stepped through the looking-glass.

There, waiting against the walls and ceiling in the warm brightness, are round, tiny chemists, clear and green as mint jellies. They are named "plastids"—chloroplastids, from the Greek word that means green. They are the most wonderful chemists in the world. They harness the energy of sunlight to make sugar from carbon dioxide and water. And from this first simple sugar is built up all the food that keeps this world alive.

The work-room cells begin to bulge with sweet liquid. There is more of it than the leaf needs for repair and fuel. It is being made so quickly that it cannot move out into the veins fast enough to be carried to the roots for storage. So another division of the laboratory sets to work condensing this glucose, or grape sugar, into cane sugar. Cane sugar gradually accumulates in stems, as in the sugar cane, and in roots such as the beet.

But cane sugar alone as a food reserve still takes up too much room. It is soluble; it can too easily be frozen, or run out of a cut and be lost. Other little chemists have to get busy, some in the leaves, but most of them in stems and roots. You would find them in spinach, in asparagus, in immature grains, in carrots, potatoes and parsnips—millions of them, tiny white dots called "leucoplasts".

They do something mysterious to the sugar, and—presto—a microscopic grain of starch is growing; growing in layers like a pearl. Some grains are oval, some angular, some are shaped like oyster shells, according to the kind of plant. Most of them grow in special cells, to be stored there until they are needed, like sacks of flour in a warehouse.

Oil is even more efficient as a storage food than starch or protein. It is insoluble in water, yet liquid, so that it can fill every corner of room. It oxidizes rapidly and with great energy, as you would find out if you should spill some olive oil or Mazola on the gas flame. Seeds and nuts are well provided with oil and protein. They can live through the winter as well as any Eskimo with his

SOME PLANTS DIGEST ANIMALS

Here we see the sundew engaged in "eating" an insect. Pepsin does the work of digestion just as it does in helping to empty the human stomach

supplies of blubber and meat.

Protein is stored as solid particles and crystals. It is the "gum" that children like to chew out of wheat. It occurs in peas, beans, corn and rye, in Jerusalem artichokes, and even in the milky juice of sweet potatoes, onions and lettuce. It is this food that goes into the making of protoplasm, that clear, living jelly that streams and eddies slowly inside every living cell.

Animals have stomachs. Or if they have not, like the one-celled animals that simply surround their food, digestion nevertheless takes place *outside* the cell. Plants do not have stomachs. The duty is shared by every cell *within* its own walls. This is the only important difference between animals and plants in the digesting of food.

Enzymes are the chemists of digestion. Their job is to make solid foods liquid and complex foods simple so that they can be used to build new cells or oxidized to give energy.

Plant and animal enzymes are so much alike as to be hard to tell apart. They have to be alike, since they each have the same kind of foods to work on. The diastase that turns the starch of sprouting barley to malt sugar is probably the same as the diastase in our saliva that sweetens bread while we chew it.

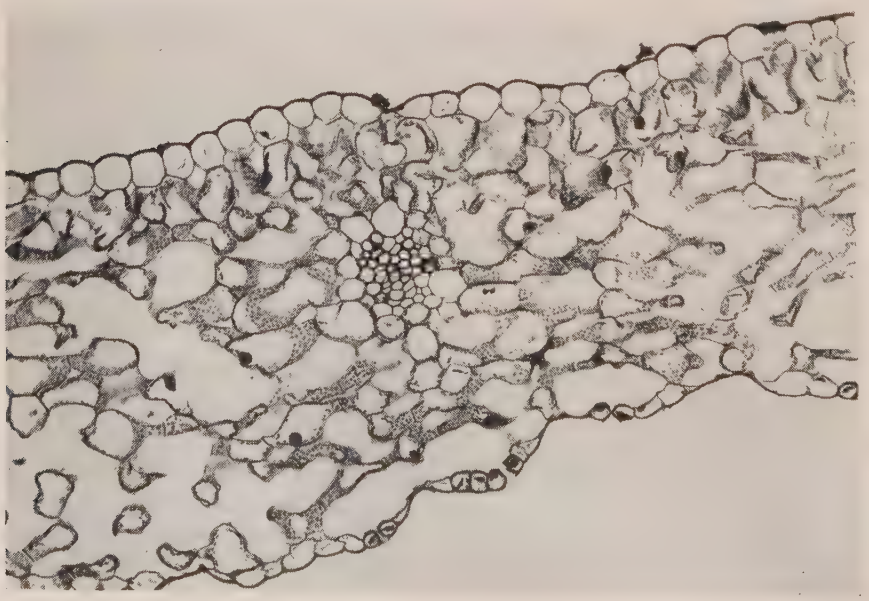
Animals digest plants. Plants can digest animal protein, too. The sundew, the Venus fly-trap and the pitcher-plant digest insects and bits of meat. The enzyme is pepsin, the same as the pepsin in our stomachs.

Another plant enzyme, papain, which is found in the fruit of the papaw, can digest egg-white almost without coagulating it. Papain will make tough meat tender if steeped with it a short while.

Bromelin in raw pineapple will partly digest gelatin and so prevent it from setting. That is why the directions on "Jello" boxes say never to use fresh pineapple. Bromelin will quickly disintegrate clotted blood, and is said to do the same to worm parasites in the intestines.

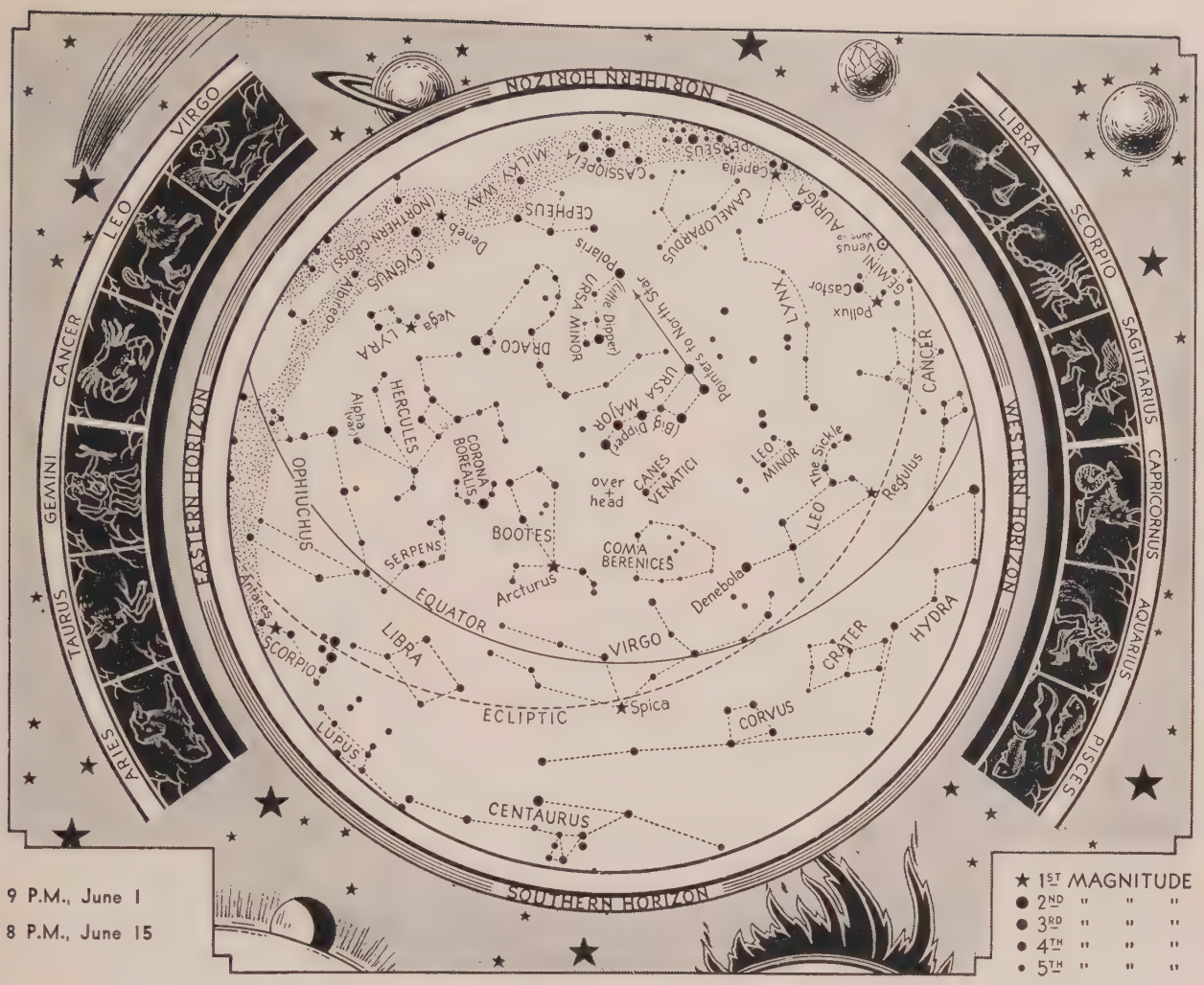
The leaves of the butterwort, *Pinguicula vulgaris,* contain still another enzyme—rennet. This plant was used by Laplanders and peasants in the Alps to curdle milk, just as we make junket by dissolving in it a tablet of pigs' rennet. In England the yellow bedstraw, *Galium verum,* used to be employed for the same reason in cheese-making. Rennet also occurs in the juice of the fig.

Erepsin is one of the commonest of protein-digesting enzymes in animals. It is also one of the commonest in plants. It occurs in green peas, in grape juice, in the leaves of lettuce and cabbage, in potatoes, (Continued on page 350)



LILY LEAF STRUCTURE, GREATLY ENLARGED

Cells are packed with chloroplasts, which give a deep green color to the upper surface of the leaf; others perform other services



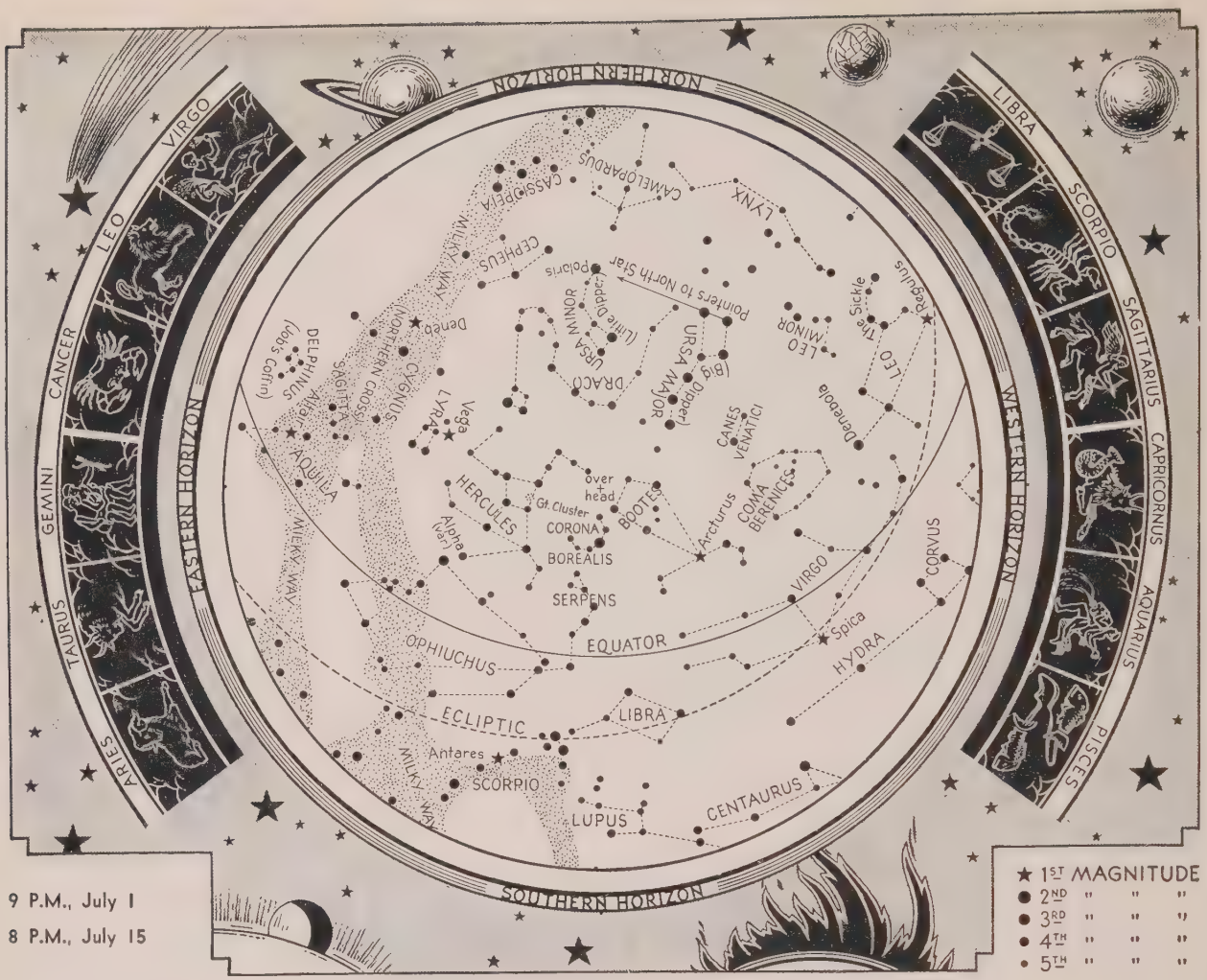
To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

The Moon—A World of Contrasts

By ISABEL M. LEWIS

IMAGINE living in a world in which at midnight the temperature falls to 240 degrees below zero Fahrenheit, and where, at midday, directly under the sun, it rises 30 degrees above the boiling point of water! Such are the extremes of temperature that exist on the moon, according to some measurements made at Mt. Wilson a few years ago. The lunar day is equal in length to half of a lunation—the period from new moon back to new moon—and is, therefore, more than fourteen terrestrial days in duration. The lunar night is of equal length. For more than fourteen days, its effect untempered by atmosphere or clouds, the sun shines with burning intensity upon the unprotected, barren, rocky surface of the moon beneath it. More than fifty per cent of the sun's rays are known to be reflected from the lunar surface, the remainder absorbed. As the sun sinks low in the lunar sky the temperature drops rapidly and hoar frost would form were there water vapor present to produce it. Even in bright daylight, in the shadow cast by the rim of a crater or a lofty lunar mountain, the temperature may drop from above the boiling point to below the freezing point. All shadows are harsh and black. A magnificent sun, enveloped in its ethereal coronal rays and streamers, which may be traced millions of miles into space, is seen projected against a sky of inky blackness, studded with countless brilliant, untwinkling stars. Sunset, or sunrise, occurs with startling suddenness. There is no haze, mist or clouds, no beautiful sunset effect, for there is no atmosphere to produce them. The long black shadows cast across a dazzlingly brilliant lunar surface are suddenly gone, to be followed by the long and frigid night.

The greatest contrast observable from the surface of the moon is in the appearance of the heavens as viewed from the side of the moon that is always turned toward



the earth, and the opposite side, from which our planet is never seen. Our satellite, as is well known, turns once on its axis in the period of its revolution around the earth. Its rotation is at a uniform rate. Its motion in its orbit around the earth is not uniform. It moves most rapidly when it is nearest the earth, most slowly when it is farthest from it. Due to this and some other causes, which we cannot go into here, it follows that the moon has "librations", or swayings, which make it possible first to see around one edge of the disk and again around another edge. The result of all this is that there is about 41 per cent of the surface of the moon that we never see, or from which the earth is never visible; another 41 per cent that is always visible. The remaining 18 per cent of the lunar surface is alternately visible and invisible.

In this border region of the moon the earth swings into view in the lunar sky for a certain period and then swings back below the horizon. When visible it is never far above the horizon. On the part of the moon that is always visible from the earth—that is, the 41 per cent always turned toward us—the earth sways back and forth in the lunar heavens day and night. The sun rises and sets every fourteen days, but the great earth-globe is always there, four times greater in diameter and sixteen times greater in surface area than either sun or moon as viewed from the earth. If human life existed on the moon we can imagine what excursions there would be from the farthest to the nearest side of the moon to see this wonderful object in the heavens. Land would be at a premium on the 41 per cent of the lunar surface that always faces the earth.

Probably nowhere in the solar system do the heavens appear as magnificent as they do from the side of the moon turned toward the earth. This huge rotating globe—huge at least to hypothetical lunar observers—would be an object of constant wonder and admiration. Its great seas and continents and islands would pass in ceaseless parade as it turned on its axis. Its phases in the course of the lunar month would be the opposite of those of the moon as seen from the earth. When the moon would be at the full the earth would be "new".

On the occasion of a total eclipse of the moon the lunar observer would see the night side of the earth turned completely toward it and surrounded by a thin ring of light—sunlight shining through the earth's atmosphere. There would not even be a complete blackout of the night surface of the earth turned toward the moon, for the light refracted by the atmospheric ring of light into the earth's cone of shadow would partially illuminate its surface as well as that of the moon itself.

Observable also on the earth disk in the lunar sky would be the sweep of the moon's own shadow across it when the moon is "new" and the earth "full". This would occur, of course, only on those occasions when

the moon is eclipsing the sun, for then only can its shadow fall on the earth's surface. What a sight our planet would be for the lunar observer, equipped with a great telescope! "Seeing", from the lunar point of view, would always be perfect on the favored 41 per cent of the lunar surface for there would be no atmospheric problems. Good atmospheric conditions on our own globe would have to be awaited, however. As the clouds would clear away we can imagine our lunar observer examining, for example, under powerful magnification that strange little marking that would be Manhattan Island. How much of the destruction brought to this world by its most "intelligent" inhabitants would be suspected by the distant lunar observer with his powerful telescope? Probably very little, if any. A great change affecting an area several square miles in extent might be noticed by our lunar observer if he were very painstaking and studying the surface in great detail. The mushroom growths of great cities might cause him to note the appearance of a hazy little spot here and there.

A great contrast exists on the moon as to the "albedo", or reflecting power, of certain of its most prominent features. Everything from harsh black to dazzling white will be found on its visible surface.

The darkest parts of the lunar surface are the shadows, wherever they fall. These are absolutely black. Next are the grayish-black and dark gray seas, or maria, so conspicuous to the naked eye and covering nearly one half of the visible surface. Quite as dark as these are the floors of some of the great walled-plains, such as Grimaldi, which extends a distance of nearly 150 miles from north to south. Almost equally dark is the surface of the huge enclosure close to it, and close to the east limb of the moon, known as Riccioli. Another object nearly as dark is the steel-gray floor of the beautiful walled-plain, Plato, nearly 60 miles in diameter and named on the maps of the 17th century "Lacus Niger Major", the great black lake. This conspicuous dark object may be seen not far from the northern edge of the lunar disk. Among the brightest objects on the lunar surface, on the other hand, are the walls of some of the craters, particularly of the great crater, Copernicus, one of the finest objects on the moon, and the white spots with which many little craterlets are associated. The whitest object on the lunar surface, the extreme of contrast with the lunar shadows, is the glistening floor and central peak of the crater Aristarchus, in the northeast quadrant of the moon. Only 29 miles in diameter, its border rises 2000 feet above the outer surface and twice as far above its dazzlingly brilliant floor.

Such are a few of the many contrasts on our satellite; in the appearance of the heavens, seen from different parts of its surface, in its temperature, and in its surface features. Later we may have more to say of the great variety of objects and markings on its surface that may be seen even with telescopes of moderate size.

During the months of June and July Mercury and Venus will be the only planets to be seen in the evening sky. Mercury will reach its greatest distance east of the sun on June 5. This is the best time to observe Mercury this year. It will be possible to find it in the northwest soon after sunset, and it will resemble a reddish star of the first magnitude. One should be able to observe it for the first two weeks in June. The planet will not be seen again until shortly before the date of its greatest western elongation on July 23, when it will rise nearly two hours before the sun. It should easily be found in the eastern sky before sunrise for the last ten days in July.

Venus will set less than an hour after sunset in June and will be difficult to observe. Its position will improve somewhat during July but it will still be low in the west in the evening twilight, setting an hour after the sun the end of July.

Jupiter and Saturn will both be near the sun in the morning sky in June and in poor position for observation. In July Saturn will rise a little before Jupiter and both planets will be seen to much better advantage.

Mars is in quadrature with the sun on June 2 and due south at sunrise. It appears as a brilliant reddish star in Aquarius. It is increasing in brightness, and by the end of July rises before midnight and outshines all stars except Canopus and Sirius.

The sun will be farthest north and summer will begin in the northern hemisphere June 21 at 2:34 P.M., E.S.T.

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Corona

By ZYLPHA S. MORTON

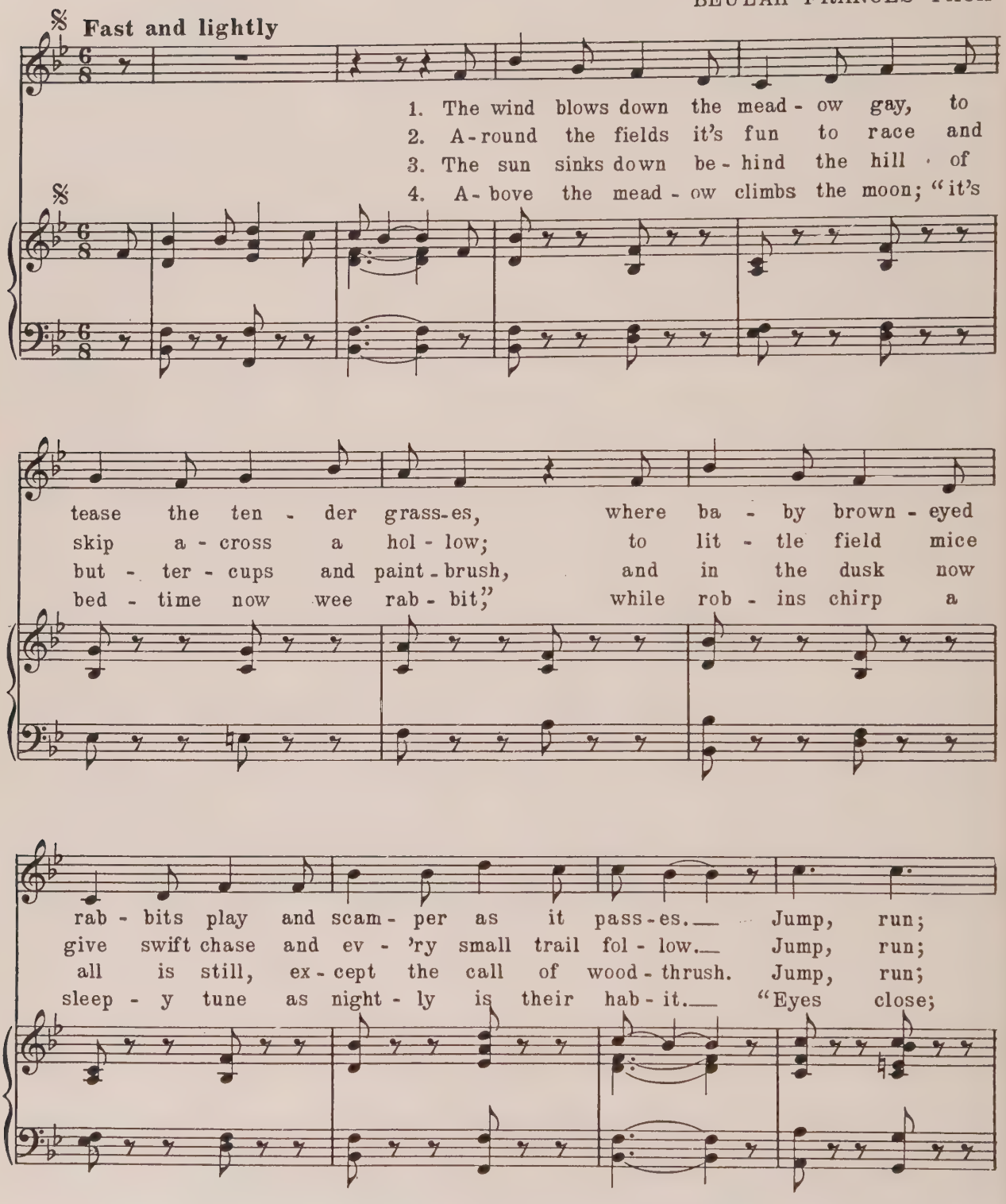
I have a diamond coronet,
Brilliant, blinding, bright,
Though Indian rajahs bid for it
It still is mine by night.

The gems are set in a sapphire blaze
Of beauty, dazzling white,
With velvet blackness all around,
As a setting for its light.

This jewelled crown is only mine
Until the morning's rise,
For with the coming of the Sun
Corona's glitter dies.

If You Are A Rabbit

Words and Music by
BEULAH FRANCES PACK


Fast and lightly
1. The wind blows down the mead - ow gay, to
2. A-round the fields it's fun to race and
3. The sun sinks down be - hind the hill · of
4. A - bove the mead - ow climbs the moon; "it's
tease the ten - der grass-es, where ba - by brown - eyed
skip a - cross a hol - low; to lit - tle field mice
but - ter - cups and paint - brush, and in the dusk now
bed - time now wee rab - bit," while rob - ins chirp a
rab - bits play and scam - per as it pass-es. Jump, run;
give swift chase and ev - 'ry small trail fol - low. Jump, run;
all is still, ex - cept the call of wood - thrush. Jump, run;
sleep - y tune as night - ly is their hab - it. "Eyes close;

Publication of this song represents a new departure for Nature Magazine, and one about which we would like advice from our readers. Would the occasional use of such songs be helpful in the school, camp, home and elsewhere where Nature in music and verse are appropriate? Would it be of aid both as inspiration and as a part of Nature teaching? This song is taken from a booklet of Nature songs entitled "If You Are a Rabbit" by Beulah Frances Pack. It is presented for entertainment and use; not for its natural history. Would you care for us to publish more? Have you suggestions? Frankly, we are not sure how to answer these questions.

O what fun to frisk a - bout in the spring-time sun; to
O what fun to frisk a - bout in the noon - day sun; to
O what fun to frisk a - bout when the day is done; to
Curl your toes and snug - gle down where the clo - ver grows; near

taste new grass - shoots one by one; — If you are a rab - bit!
taste new grass - shoots one by one; — If you are a rab - bit!
taste new grass - shoots one by one; — If you are a rab - bit!
where the friend - ly brook - let flows: — If you are a rab - bit!"

The Hippopotamus

By EDITH M. LAING

When good looks were given out the hippo must have been behind the door. However, it enjoys compensation, for it is freely credited with keen intelligence and a placid and inoffensive disposition. In spite of the latter claim for the lumbering creature pictured on a Liberian stamp, no traveller in a small boat would care to dispute the right of way with him.

Prehistoric evidence of the water horse has been found in England and western Europe, but only two species have survived, both of these in Africa. These cousins of the pig, sometimes weighing three tons, were once plentiful in rivers and lakes all over that continent, but in parts since developed as plantations and farms they have been gradually exterminated. So it is that the hippopotamus, once venerated as a sacred animal in Egypt, now pursues its way of life only in certain of the wilder areas.

The hippopotamus lives on shrubs, roots and aquatic plants. He is equipped with two tusks in the lower jaw shaped for tearing out bushes, and two in the upper designed for digging roots. In captivity, where no effort is required to get food, these tusks have to be kept filed. The operation entails considerable studied maneuvering to anchor the massive creature and prop open its cavernous mouth.

During the day the animals lie and doze in the water with just the ears and the prominent eyes and nostrils protruding, or else on a mud bank partly submerged. The night is spent in feeding. In the rainy season, when plants become tender and succulent, hippos put on huge rolls of fat. They are good swimmers, and have been seen travelling by sea from the mouth of one river to another. Native boatmen give them a wide berth, for cow hippos with calves are all too ready to attack canoes. Flesh and hides are used by the natives, who hunt the animals with harpoons and spears, or else trap them in pitfalls.

When the animal is excited, the thick hairless hide exudes a strange carmine red perspiration, and thus it is that circus men advertise the "Blood-sweating Hippopotamus"!

THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

Weeds, in the School Program

Someone once asked what to do about the dandelions in his front yard. The answer was, "Learn to love 'em". If one asked the average teacher what to do about weeds in the schoolroom, the answer might be, "Make mounts of them or of their seeds or study how they spread their seeds". There is no denying that interesting weed studies can center around weed and weed seed herbaria and notes on seed dissemination, but in general this leaves out some of the best things weeds have to offer.

The insert in this number of *Nature Magazine* should suggest a few things about weeds that are worth knowing, but there are still others that should be mentioned.

Weeds, Raw in the Patch. Just as a duck is unnatural out of water so a weed is unnatural outside the patch. Why not then study it first in the patch? At first let us not worry even much about what kind of weeds we have in the patch. Anyone can know a weed patch from a cultivated field even if he cannot tell lamb's quarters from amaranth. For our first studies we would like something that will measure temperature; something that will measure humidity, and if possible something that will measure light intensity. With these we can get some idea of some ways in which the weeds influence the ground they cover.

It should not be difficult to find something which will measure temperature. Everyone knows that a thermometer will help here but even without the thermometer we can get some satisfying evidence. Some warm day go into a field where there are an abundance of stones and some dense clusters of weeds. Pick up a stone that has been exposed to the direct sun and another which has been in the shade of the weeds. What difference can be noticed in their temperature? Then set to work with a thermometer and explore the weed patch from one end to the other. Where are the coolest spots and how much cooler are they than the open spots, or are they warmer than spots to be found in the open? This may help one in understanding what influence the shade of weeds may have on loss of water.

But how are we going to get an idea about the loss of water? We may have no expensive equipment available for use here. Don't let that worry us. Our files of *Nature Magazine* should show us a nice article on humidity in which we learn that certain kinds of curly hair curls when it is moist and straightens when it is dried. Probably we knew this before we were ever readers of the magazine. Well, if this is so why can't we get some idea of water loss in a weed patch by putting some bunches of hair in different places to see where it curls most tightly? Maybe we will lose the hair and need something more spectacular. All right. Take some strips of tissue paper or of cellophane and lay them on the ground. They look differently if they lie over thoroughly dried ground or over moist ground. Why not use them to explore crudely the water-loss that may be associated with our weed-patch? What do we discover by our using the thermometer and the cellophane in the manner suggested?

It may not be so easy to make a permanent record of how a weed patch affects the light that reaches the ground beneath. We can see with our eyes that there is shade under the weeds. But how shady is it? If blue-print paper has been used in making leaf prints a solution should suggest itself by exposing two pieces; one in the shade and one in the sun and then noticing the different results. But if we have an exposure meter such as is used by so many photographers nowadays we can get a figure which can be recorded much as we could record the temperature from the thermometer. Now we have something to work with; differences in temperature, in humidity and in light.

Another thing which might be measured in the weed patch is the speed of the wind. We do not need to get this in miles per hour. All we need to know is whether the wind is stronger in the weed patch or in the open. It is simple to learn something of this by means of thread streamers or thin tissue paper streamers hung from horizontal supports in the weeds and in the open. Where the wind blows the more violently the streamers are more nearly horizontal. Now we have something else to work with. If the wind does not blow so strongly in the patch it cannot carry so much loose dirt and we will have less wind erosion.

Now when it rains we may watch our weed patch if it is on a hill to see if there is any difference in the amount and appearance of the water that runs from a bare hill and a weed-covered hill; and we may explore the underground parts of the weeds and find how effective the despised quack grass is as a soil anchor. And so we find that a weed patch has much influence on the ground it covers and much of this influence is for the good, and possibly we may see merit in an area that we had been taught to consider as wholly bad.

All of these things are good local geography, science, nature study or conservation or are basic in those fields.

It may be well while we are in the weed patch to see how many plants of any one kind may grow in a square foot of soil. Then we may count or make some estimate of the number of seeds that plant may produce in that area and how many must be considered as unnecessary surplus which could be harvested without in any way interfering with the success of the species. And so we find we have another basic lesson in wild life management and in agriculture amply illustrated by our weed patch.

While we are looking at the seeds it might be well to get some idea of which of them might be useful as food to game birds or to other birds. If we don't know the answer we might collect a quantity of different kinds. Next winter when we have a bird feeding station we might offer our visitors piles of ragweed, of amaranth, of mustard and so on to see which if any of these are favored by the birds. And still we haven't used a book to learn a single thing, and still we have not exhausted the possibilities of a place which we had thought more or less worthless.

Still, while we are looking at those seeds it might be fun to get some idea of how they behave under different circumstances. Sprinkle a few of them on some damp paper. Do any of them stick to the paper better than others? Do any of them dry firmly stuck to the paper because of sticky coats they have? It might be well to be sure that a few mustard seeds are used in trying this out because so many of them have mucilaginous coats that will give spectacular results. For example try such members of the mustard family as the common shepherd's purse and pepper-grass. When we find that some of these weeds have coats which take up moisture quickly we may understand why they succeed so well in establishing themselves in territory where other plants cannot survive. And so we have a whole new study opened up which we surely do not have time to outline here.

We might go on and notice which if any of the weeds of our patch are favored as food by whatever animals live in it. This would apply to the larger grazing animals and to the diminutive insects as well. Some of these insects may supply useful food to valuable game species. But we have not enough time to follow up all of these leads.

Weeds Indoors. We may wish to do what the others do and make weed herbaria. That is all right if we have no originality. We may also feel like making attractive bouquets of weed tops and again we may like to do as the other fellow does and try to "paint the lily" by spraying the tops with gilt or silver paints. But why do we have to be sheep? Why not see the beauty in the natural weed? Why not see if we can identify our weeds indoors by their smell or by their taste or by how they feel? Why not put equal portions by weight of two weeds on a simple balance; let them dry and see if each loses the same amount of moisture? Why not test all the weeds available to see if any of them have possible value as producers of fiber? If milkweed or dogbane or wild hemp, or stinging nettle get into our collections we may find something particularly interesting here.

If we have our weed seeds indoors it may be interesting to count out a hundred seeds of some one kind and see how many of them germinate when they are placed between damp blotters. The number that germinates will of course give us directly the percentage of germination of that group of seeds. We may be surprised to notice how this number varies with the seeds of different kinds of plants, and that many of the most useful kinds may have a low percentage of germination while the apparently pestiferous kind have a high percentage. This may make us do a little thinking about what might be done to help those plants we wished to encourage, and thinking should never be against the law in school.

Again let me remind you that everything suggested here as a school activity may be done without the use of a single book; the weeds in the patch or in the school are the books. Why not try to read them?

Dr. Palmer would be interested to have any suggestions from readers as to subjects they would like to have covered in this series of special features.

WOW . . . When we announced our travel service in the May issue of NATURE, we expected our readers would like it BUT . . . never did we anticipate the grand response and welcome you gave this new department.

From 18 states came post cards, letters, and even telephone calls, inquiring for specific travel information. These inquiries were for Camps (adult and children); Cruises; Dude Ranches; Resorts; City Hotels from coast to coast; Pack Trips and Trailer Trips to the National Parks of the United States and Canada.

We were amazed to find that so many of our readers plan to visit Dude Ranches, and great cities, this year, and several plan to do both.

John Hayden, our well-known travel consultant, is ready, however, to send you all the information you require to make this year a most pleasant travel and vacation time.

If you plan a jaunt with rod and reel, or to hunt with a camera for Nature's wild life or city skyscrapers, depend on us to keep you well advised.

For your convenience we suggest you use the form below for resort, camp or travel information. All information gladly furnished without obligation.

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CELESTIAL BEAN

(Continued from page 337)

soybean growing regions in recent years, so that farmers have some large corporations fighting with them for markets. The great paint, milling and starch companies are much interested in our celestial friend. So are Henry Ford and the great firms that are making plastics from farm products.

Yes, our little, brown, Oriental bean (sometimes he is yellow or green) has come quite a way since he sneaked in via the knapsack of Dr. Morse and the other plant hunters. You will be meeting him more and more in some form or other, on the table, as substitutes for salted peanuts, in candy nutbars, and in the garden.

But your own garden is the best place to get acquainted first hand. It is a little late to start this season, but if you want to try them, we have made up a list of places where the edible soys can be bought; also a short bibliography of booklets and other free literature. You can have this list for the asking. Just send a stamped, self-addressed envelope to Garden Editor.

Michigan Summer Course

On June 30 the twenty-third session of the Biological Station of the University of Michigan on the shores of Douglas Lake in Cheboygan County will begin. This eight-week summer course, terminating on August 23, is devoted to the teaching of botany and zoology and to research in these fields. Information about the 1941 session came to us too late for earlier announcement, but readers interested may obtain additional information from Alfred H. Stockard, The Biological Station, University of Michigan, Ann Arbor, Michigan.

Skunk Discipline

Esther Lewis of Shoreham, Vermont, writes that she was out for an August saunter along a woods road when a mother skunk and one youngster crossed the path about a rod and one-half ahead. "They had come," she says, "from the woods and were headed for a meadow. To reach this they had to climb a steep bank that had been washed clean of grass or other vegetation by the rains. The mother made the ascent easily and turned back to see how her offspring had done. The baby had not even tried to climb and was standing at the bottom uttering a squeaky little protest. The mother talked back to the baby, seemingly with stern orders. It only whined the more. Down the bank she came, put her nose behind its sitdown and pushed it up the bank. Then she came back toward me with more speed than seemed necessary. I fled."

Newark Field Trips

Unfortunately too late for an advance announcement, an outline to the spring field trips for amateur naturalists sponsored by the Newark Museum Nature Club, Washington Park West, Newark, New Jersey, has recently come to hand. Other similar trips will be planned in the future and amateur naturalists in the Newark region should certainly take advantage of them.

NATURE STUDY

A group is being organized for the study of botany and ornithology under the leadership of Chas. H. Rogers, well-known ornithologist and Curator of Princeton Museum of Zoölogy.

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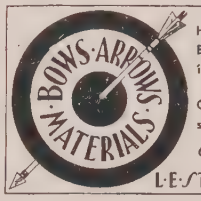

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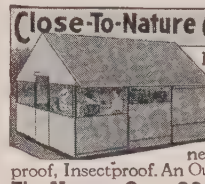

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NATURE IN PRINT

As a convenience to readers the books reviewed in the pages of Nature Magazine may be ordered through the book department of the American Nature Association, 1214 16th St., Washington, D. C.

(Continued from page 307)

Mammalogy, or of a whole library of Government wildlife publications, the slips of the pens and errors of omission of other writers. The care that he takes in answering a reader's inquiries is amazing. And there are few of Mr. Preble's writing colleagues of the past fifty years who could not testify to having received enough of his time to have filled many pages of manuscript of his own.

It is ungracious indeed to complain about favors, but for the future let it be said that Mr. Preble's own writings are what we need and want. Let it be a matter of grave concern, something reprehensible, for anyone with a serious purpose to beguile Mr. Preble away from his writing. Let the editors of magazines and the publishers of books know that there is an author here who needs only persistent inducement and gentle goadings to enrich their tables of contents and their lists of publications. Reminiscences, sketches, essays, and descriptive articles, and treatises on wildlife conservation—let them be written and published. Let the years come on. Let the presses roll.

Congratulations, Mr. Preble, and supplications!

Garden Book

The Complete Book of Garden Magic. By Roy E. Biles. Chicago. J. G. Ferguson. 1941. 308 pages, with color plates and diagrams. $3.00.

In twenty-seven chapters in this book are packed a wealth of gardening information, covering a wide range of subjects from garden planning to a calendar of garden operations. Lawns, shrubs, evergreens, rock gardens, roses, hedges, water gardens, insect pests, plant diseases and other important garden subjects are included. There is even a chapter on soilless gardening, and another on window boxes. The author has put together an amazing amount of information, and has produced a book that any amateur gardener with catholic interests would find of perennial value in his home library.

For Fishermen

Virgin Waters. By Leighton Brewer. New York. Coward-McCann. 1941. 224 pages with illustrations. $2.50.

As the sub-title indicates when it says, "thirty-five years in quest of the squaretail trout", this is a book for the fisherman. The author is an enthusiastic Waltonian and includes much about the mechanics of fishing in his text.

Nature Games

Nature Games Book. By Elmo Stevenson. New York. Greenburg. 1941. 208 pages with illustrations. $2.50.

In this handy and useful little book the author, who is professor of science education at Oregon State College, has gathered together a variety of games that may be played and at the same time stimulate an interest in Nature. It is a book that will be useful to teachers, camp counsellors, Nature leaders and recreational workers. While there are several books of games, we know of no other confined to Nature games. There is still a job to be done through the publication of a book of Nature plays designed for varied age levels and presenting, in this form, Nature and conservation information.

Garden Humor

Who's Zoo in the Garden. By Charles Palmer, Jean-Marie Putnam and Lynette Arouni. New York. The Greystone Press. 1941. 128 pages with illustrations. $1.50.

This is an entertaining and attractive little book that combines smiles with information. Mr. Palmer has written some amusing verses; Miss Putnam has followed them up with some factual descriptive matter about the subjects of the poems; Miss Arouni has pictured them. It is a winning combination.

Botanist and Gardener

Science in the Garden. By H. Britton Logan and Jean-Marie Putnam, with Lloyd Cosper as consultant. New York. Duell, Sloan and Pearce. 1941. 247 pages. $2.50.

To us this is the most interesting garden book that has recently come to hand, and one that is utterly different from any other. The authors have started with the idea that there should not be a wide gap between the amateur, or, even, professional gardener, and the botanist and scientific student of plants. Their text, then, seeks to bridge that gap; to show the gardener what the scientist contributes and the scientist what the gardener knows and wants in a relatively unscientific way. The book shows a variety of directions in which further research is necessary. New developments in horticulture are considered and evaluated. The text is popular and as interesting to read as it is informative.

Animals for Youngsters

Animals Through the Year. By Margaret Waring Buck. Chicago. Rand McNally and Company. 96 pages, with illustrations by the author. $2.00.

This is an attractive book for the youngsters, with interestingly written text and attractive illustrations. The author has divided her discussion of the mammals into four seasons and has produced a simple natural history.

On Forest Trees

Textbook of Dendrology. By William M. Harlow and Ellwood S. Harrar. New York. McGraw-Hill Book Company. 542 pages. Illustrated. $4.50.

This is a second edition of this important dendrological textbook in which the major changes from the first edition are the inclusion of range maps for all of the species covered and provision of tables of distinguishing characteristics. In this volume we have, therefore, a thorough presentation of fact, both scientific and cultural, about the important forest trees of the United States and Canada.

Sierra Bulletin

Always a delight to the outdoor and mountain-minded person, the February, 1941, issue of the *Sierra Club Bulletin* is particularly outstanding. It is devoted in considerable measure to the new Kings Canyon National Park, with articles about it that are of permanent value historically and descriptively. These articles are supplemented by thirty-four beautiful illustrations of the Park. These are a treasure in themselves. Mountaineers will find the article entitled "A Climber's Guide to the High Sierra," dealing with the Whitney region, specially valuable. With 158 pages, plus the illustrative plates, this issue is well worth its price of seventy-five cents.

DO PLANTS EAT?

(Continued from page 342)

turnips and beets. The erepsin of cabbage will clot milk and liquefy gelatin.

The original purpose of these plant enzymes was not, of course, to clot milk or liquefy gelatin. It was to digest the food stored in the plant.

See what they do to our potatoes! When the first stubby sprouts appear they are already busy at work. They are corroding starch grains. The starch is turning to sugar and streaming up to the new cells, leaving the old cells empty and watery. The potato gets flabby, the skin shrivels, and the sprouts grow longer and longer.

You reach in the gunny-sack for an onion. Ugh! Its firm white layers are decomposed and vigorous sprouts are twisting out through the meshes. Food is being broken down. Protein particles are being rebuilt into new protoplasm, starch particles into new cell walls. Sugars are oxidized; energy released. And here we are back where we started, with carbon dioxide and water.

Once there was a Hindu fakir, who, as people gathered around to watch him, would empty vials of vari-colored sand into a glass of water. He would drink the muddy mixture. Then, while a murmur of admiration swept over the crowd, he would blow the sand out of his nose all dry, each color in a separate heap.

If the fakir had, instead, used the sand and water with the air he breathed to make food, everyone would have run up and down shouting that it was the greatest miracle the world had ever seen. But let this miracle be performed in a potato, and no one pays any attention.

Yes, there is such a thing as plant food. We and the plants eat it every day.

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BIRDS AND BLITZ

(Continued from page 312)

represented by three species, two of which are resident, although two other species, the white and the blue-headed visit us more rarely, and have bred here. The pied wagtail is a dainty gray and white bird seven and a half inches long. It is found everywhere in the vicinity of ponds, streams and ploughed land. The gray wagtail haunts mountain streams in the spring and summer, but migrates to the lowlands in winter. It has a pleasing song, which, with the bird's slender grace and pastel shades, seems quite in keeping with the tumbling brooks that form its haunts. The yellow wagtail is a summer migrant often found in similar situations as the skylark, although rarely in the immediate vicinity of dwellings. It is not necessarily restricted to the waterside although it is commonly found in fenland districts or in country that resembles Holland in character—flat country that would be marsh if not adequately drained. The nest is built under a tussock of grass in pasture-land, in crops such as turnips, or corn, or in hay fields, and the four to six eggs are a beautiful dark brown in color.

The picture of the yellow wagtail shown here was obtained in the corner of a meadow bordered by a dyke. There the grass and buttercups were much too tall to permit the birds to be photographed actually at the nest. The young were fed every few minutes, both adults bringing huge beakfuls of crane-flies. They alighted momentarily on a spray of bramble that had been placed near the nest for that purpose. The male bird was bright yellow, but his mate was much duller. The incessant movement of the long tail presents a real problem to the photographer, but it enables all the wagtails to turn rapid somersaults in the air when catching flies as prey. In looping the loop, the white outer tail feathers are well displayed. It is not so easy to determine how a wagtail manages to retain, say, nine flies in its beak whilst performing the aerial evolution necessary to snapping up the tenth. The wagtails, like the tits, and the swallows, are the farmers' friends, working unceasingly in reducing the insect life that otherwise would increase to an extent sufficient to make agriculture unprofitable, and every product of the farm is vital these days. So our birds are doing their bit.

Following are the technical names of the birds mentioned in this article: song thrush, *Turdus philomelos clarkei;* chiff-chaff, *Phylloscopus collybita;* willow warbler, *Phylloscopus trochilus;* sedge warbler, *Acrocephalus schoenobaenus;* white-throat warbler, *Sylvia*

(Continued on page 353)

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TO THE EDITOR

Because of the severe demands for space in *Nature Magazine* we have never had a regular TO THE EDITOR department. The many letters of suggestion, criticism, inquiry and praise we have received have been appreciated and acknowledged. Fortunately there are few pointing out errors, although now and then a slip gets by despite vigilance and care. We are starting, however, a letter corner here and should be interested to hear whether readers would be interested in its continuance. Communications about the magazine and its editorial and conservation policies will be used. We will have to reserve the right occasionally to condense letters because of space limitations. EDITOR.

Miss Hill Really Went

Dear Sir:

After reading the May, 1941 issue of NATURE MAGAZINE I have come to the conclusion that Dorothy M. Hill's article on the new Kings Canyon National Park, under the title of "The 'Second Yosemite' ", should be captioned, "Jumbled Sierran Geography".

1. Mt. Starr King, referred to as being just above the junction of Paradise Valley and Bubbs Creek is about 100 miles to the north in Yosemite Park. It is Mt. Clarence King that is in the above location, just Mt. King on the map.

2. "Rea Lakes" should be Rae Lake.

3. "Bubbs Creek eventually levels out into Upper Basin;" Upper Basin is at the headwaters of the south fork of the Kings River. Bubbs Creek leads to Junction Meadow and Vidette Meadow.

4. According to the Mt. Whitney quadrangle Mt. Brewer is 13,577 feet high (not 13,570) and University Peak is 13,588 feet in elevation (not 13,585). Mt. Whitney is 14,496 feet in elevation, a bit more than ". . . only a few hundred feet higher than Mt. Brewer, ...".

5. ". . . . with the Thousand Lakes Basin and more mountain ranges beyond". The authoress probably means Sixty Lake Basin. Maps of the Sierra Nevada show no Thousand Lakes Basin, but there is a Thousand Island Lake much to the north of Sixty Lake Basin.

6. The authoress mentions going down Paradise Valley and coming out at Junction Meadow. There is no meadow at this point. Junction Meadow is on the upper section of Bubbs Creek, about 12 miles above the meeting of Bubbs Creek with the south fork of the Kings River to form Kings Canyon.

I have made two pack trips into the region described in "The 'Second Yosemite' " and doubt that the authoress did any checking with the topographical maps that she claimed were available. One who knows that section of the high Sierra is inclined to wonder whether she really made such a trip.

RICHARD G. JOHNSON

San Francisco, California.

At least Kings Canyon National Park was properly located in California. We regret these geographic errors and should have checked this article, but had been given to understand that it had been gone over by authorities on the Sierra region. Also we had no topographic map of the Park and the National Park Service has not yet issued one of its excellent booklets on this Park. Thank you, Mr. Johnson. EDITOR.

No Patent

Dear Sir:

I thank you very much for sending me a copy of NATURE MAGAZINE, and I read the article on page 288 entitled "Bag Limit on Trees" with very great interest. That is an apt expression. I am going to adopt it for my next speech on forestry. I do not presume you have a patent thereon.

WALTER M. PIERCE, M. C.

Washington, D. C.

Thanks, Mr. Smith

Dear Sir:

That certainly is an A1, nonpareil, world-beater magazine you are publishing. We enjoy it thoroughly.

St. Louis, Mo. LUTHER ELY SMITH

Helps the Golfer

Dear Sir:

The insert "Marshes and their Environs" is particularly appealing to me since I am one of the members of our Country Club who are opposed to grooming the marsh fringes of our lake. It occurred to me that it might be a good idea to send NATURE MAGAZINE, with this insert, to the entire membership . . . I want to thank you for the exceeding promptness with which twelve copies of your April issue were sent me. These have been distributed to our Board of Directors and Greens Committee.

Chicago, Ill. CARL PRELL

Reasons for Failure

Dear Sir:

The editorial in the April issue of NATURE MAGAZINE under the page heading "As We See It" expressed ideas that I have long felt to be true although quite frequently I hated to admit them even to myself. Nevertheless it is unquestionably true that the genuine conservationists have not been successful in spreading their doctrines and in making converts. There are, I believe, three principal reasons for this failure.

First, as a result of the story of Genesis in which there is the statement that man shall "have dominion over every living thing that moveth upon the earth", many persons believe that all living things were intended by God for man's use as man should see fit. Only recently, in the dispute over the bill to allow the shooting of quail in Ohio, one of the advocates of that infamous measure argued that all life was put on the earth for man's enjoyment. It would be a strange God, indeed, who condoned the shooting of so valuable a bird as the quail for the sole purpose of "sport." Yet, in effect, that very argument was advanced.

Second, strange as it may seem and contradictory as it may at first appear, the theory of evolution has led men to believe in the same manner as has the story of Genesis, namely, that man is the highest form of life—the end product of evolution—and that all lower organisms are, therefore, beholden to him. It is not truly the theory of evolution that is at fault, however; rather it is the misinterpretation of that theory. When men realize that evolution is still going on and that they are not necessarily the end product, perhaps they will reorient their way of thinking and see themselves as just one species of animal among a host of species.

Third, and probably most important of all, man's cultural level is still so low, in spite of universal education, that we really cannot expect a great deal of him. All kinds of cultural activities are available to those who can appreciate them. In addition we have a tremendous number of wholesome recreational activities both for those who wish to participate and those who wish to look on. Yet, with all these diversified opportunities, many men still think of recreation in terms of the pursuit and eventual destruction of those forms of life which they consider lower than themselves.

It is manifestly, then, the problem of the church and the school so to raise man's cultural outlook as to cause him to appreciate the biosphere of which he is a part and understand truly his place in it. When that time comes, and only then, will the snipe, and the quail, and the bighorn sheep be safely secured from the threat of extermination, and will there be a genuinely sincere policy of conservation everywhere within the United States.

DONALD L. NEWMAN

Cleveland Heights, Ohio

Cuban Natural History

A summer session course in Cuban natural history will be held from July 21 to August 30 at the University of Havana under the direction of Dr. Abelardo Moreno, zoology professor. The course will, of course, be given in English and is designed for people interested in natural history wishing to spend the summer in Cuba. The course will be a combination of museum and field work, and lectures. For information write to Dr. Abelardo Moreno, Museo Poey, Universidad de Havana, Havana, Cuba.

Forest Study

Climaxing a three-year study of the nation's greatest timber reserve in the Pacific Northwest, the Charles Lathrop Pack Forestry Foundation announces as its latest publication a guide for the appraisal of timber cropping possibilities in Douglas fir forests. Prepared by Bruce Hoffman of Portland, Oregon, and bearing the title *Management Possibilities in Douglas Fir Forests*, this report provides a yardstick by which forest operators in the region may determine whether their properties can be put on a permanent timber-producing basis. Copies of the report are available from the Charles Lathrop Pack Forestry Foundation, 1214 Sixteenth Street, N.W., Washington, D. C.

Bird Houses

Entirely rewritten and expanded to include western bird species, the third edition of *Bird Houses*, popular and useful booklet of the Cranbrook Institute of Science, has recently been published. Beside containing information on the proper kinds of bird houses for various birds, the booklet contains data on bird baths and feeding shelters and information on how to make them and where to place them. The author is Edmund J. Sawyer, who has also illustrated this attractive 40-page publication. Copies are available for twenty cents from the Cranbrook Institute of Science, Bloomfield Hills, Michigan. It should be in the hands of everyone wishing to attract birds to their homes.

(Continued from page 351)

communis; reed warbler, *Acrocephalus scirpaceus;* garden warbler, *Sylvia borin;* hedge accentor, *Prunella medularis occidentalis;* great tit, *Parus major newtoni;* cole tit, *Parus ater brittanicus;* blue tit, *Parus caeruleus obscurus;* robin, *Erithacus rubecula melophilus;* white wagtail, *Motacilla alba;* pied wagtail, *Motacilla alba yarrelii;* gray wagtail, *Motacilla cinerea;* blue-headed wagtail, *Motacilla flava;* yellow wagtail, *Motacilla flava rayi.*

Mammalogists Meet

The twenty-third annual meeting of the American Society of Mammalogists will be held at the Field Museum of Natural History, Chicago, from June 9 to 13, with headquarters at the Stevens Hotel. Business sessions and general sessions will culminate with a special visit and luncheon at the Brookfield Zoo on Friday, June 13.

Indiana's Tree

In 1931 the Indiana Legislature, by official action, recognized the tulip tree, commonly called yellow poplar, *Liriodendron tulipifera,* as the tree of the Hoosier State. To further recognition of this tree the Indiana Historical Society has appointed a special committee on State Tree and Roadside Planting, and has issued a little folder containing practical advice on planting. If you live in Indiana, and want to help beautify the State and do honor to its official tree, write to John S. Wright, 4411 Washington Boulevard, Indianapolis. He is chairman of the committee.

Nature on the Air

Nature went on the air on May 3 for the fourth year from Rocky Mountain National Park with the renewal of the public service feature of the National Broadcasting Company known as "Nature Sketches." This is a unique program originating by remote control in the field. Young visitors to the Park join with Park Naturalist Raymond Gregg to provide informal programs that are fascinating. Broadcast over the red network of N.B.C., the program goes on the air at twelve noon, Mountain Time.

Robin Habits

For several years John B. Wright has observed the habits of robins near his home in Yonkers, New York. Living on a shady street with large, densely-leaved maples, he has witnessed some unusual concentrations. One August evening in 1937 he counted about 900 robins roosting in three trees, the birds apparently coming in from a marshy area a few miles away. In 1938 similar congregations were noted at about the same time of year; about 1200 birds being counted one evening. Starlings and blackbirds were more numerous in 1939 and took over the trees to a large extent, but in 1940 the robins seemed able to hold their own despite numbers of starlings and blackbirds. Mr. Wright counted 800 one evening. During the nesting season, he says, robins are not numerous in his neighborhood. When the birds leave in the morning it is with a sound like the rushing of the wind.

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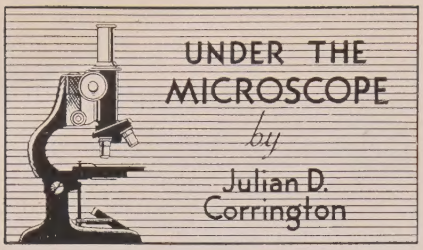


Amphioxus

A fish-like thing appeared among the Annelids one day.
It hadn't any parapods or setae to display.
It hadn't any eyes or jaws or ventral nervous cord,
But it had a lot of gill slits and it had a notochord!

—*Philip Pope.*

This opening stanza from a poem well known to biologists calls attention to some of the distinguishing features of our guest animal for this month. Amphioxus (Greek, both-sharp; i.e., pointed at each end) is a former scientific name that has now become the accepted common term and stresses much the same characteristic as in the British designation Lancelet (little lance). Our illustration of a whole mount shows this pointed shape. The second word of the scientific appellation, *Branchiostoma lanceolatum,* is similar, while the first word means gill-mouth, given in the mistaken notion that the finger-like tentacles around the mouth opening were external gills.

Various species of these small marine creatures are from one-half to almost four inches in length, averaging two to three inches. The group as a whole is world-wide in distribution and ancient in lineage, presenting us with a picture that displays vertebrate anatomy in its simplest expression. When biologists pursue comparative vertebrate anatomy they invariably go back to amphioxus for the beginnings of the many complex organ systems of higher types, and regard the study of this animal as of fundamental importance. Nearly all work on this organism is done from whole mounts and sections on microscope slides.

In embryology, likewise, most of the earlier stages and processes exhibit a clear and easily comprehended plan of development, whereas this basic design is often obscured in more advanced forms. No wonder, then, that our subject has been dubbed the "vertebrate Adam-and-Eve," and the "ancestor of the vertebrates." Someone once called it "a fish in the making," while another classical remark was to the effect that if amphioxus had not been discovered, we would have been forced to invent one. The "missing link" between invertebrates and vertebrates is no longer missing.

According to Newman, the oldest recorded description of the lancelet is that of Pallas, 1778, who fancied it bore some resemblance to the common garden slug and hence named it *Limax lanceolatus.* In 1804 the Italian naturalist Costa studied this species more critically, observed its vertebrate affinities, and conferred the present technical name, while Yarrel shortly thereafter made a separate investigation and proposed the title *Amphioxus.* From that day until the present countless zoologists have worked on this little animal until now it is one of the most thoroughly understood of all laboratory types.

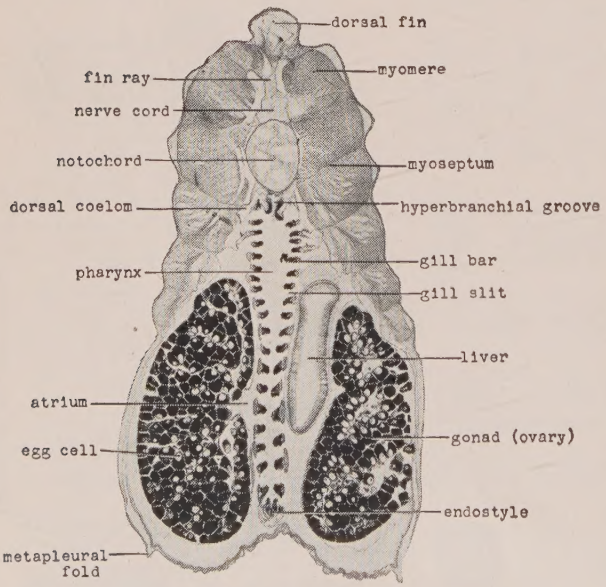
When Professor Johannes Müller described a preserved specimen a little more than one hundred years ago, he called attention to its unique features, and soon Lamarck's older classification of all animals into either invertebrates or vertebrates had to be revised. In order to accommodate this form, which was obviously vertebrate in its relationships, yet lacked vertebrae—that is, a segmented backbone—a conception of some group of higher and more inclusive rank than the Phylum Vertebrata was needed. Thus arose the designation of the Phylum Chordata, to comprise all animals possessing a *notochord* at some stage of life, the vertebrates slipping back to the status of a subphylum.

Reference to our labeled illustrations, all of which are photomicrographs of stained specimens, will furnish essential details for an understanding of the anatomy of amphioxus, so that the following description can stress the physiology. The skeletal system consists principally of the notochord, from which the name of the phylum is derived. It is a longitudinal stiffening rod, running from one end to the other—the main beam upon which the softer tissues are slung—and is composed of a unique form of cell, large and vacuolated. Firm, yet elastic, the notochord provides the muscles with necessary support and at the same time remains flexible for swimming and burrowing movements. Other skeletal elements, gelatinous or semi-cartilaginous, occur as supports for the base of the dorsal fin, in the gill bars and buccal cirri. Surrounding the notochord, nerve cord and aorta as sheaths are dense membranes that continue outward as myosepta or partitions between muscle bundles, finally merging with the dermis of the skin. This entire scaffolding of membranes makes up the connective tissue skeleton.

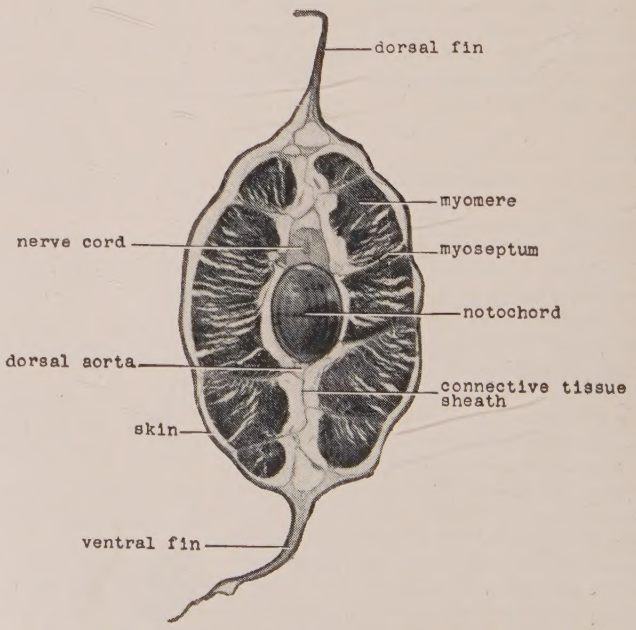
The muscle bundles are known as myomeres, or myotomes, and are seen as block-like masses in section and as chevrons in surface view, with the apex of each V directed forward. They comprise the muscular system, make up the bulk of the body wall, and exhibit a very primitive plan of segmentation. The skin is extremely thin and simple, the epidermis being but one cell in thickness while the dermis is gelatinous.

Locomotion is performed by contraction of the myomeres, first on one side then the other, the notochord giving anchorage and preventing buckling, while a continuous fin fold aids by presenting a flattened surface to the water. The dorsal fin extends from rostrum to tail, where the fold expands somewhat as the paddle-like caudal fin, then turns forward as a ventral fin to the anus. Here the fin fold divides and passes forward in an oblique upward slant on each side.

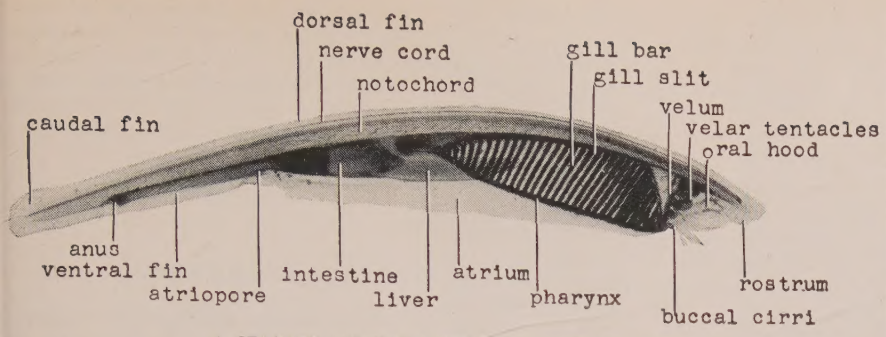
The notochord is the primary characteristic of the phylum, while a second cardinal feature is the possession of a dorsal, hollow nerve cord, homolog of the spinal cord of vertebrates. In the larva this tube expands at



CROSS SECTION THROUGH REGION OF POSTERIOR PHARYNX. COURTESY WARD'S NATURAL SCIENCE ESTAB.



CROSS SECTION THROUGH TAIL, SIMPLEST EXPRESSION ON FUNDAMENTAL BODY PLAN OF VERTEBRATES



A STAINED WHOLE MOUNT OF AMPHIOXUS

the front end into a brain, but, alas for the mental faculties of the mature amphioxus, there is a retrogression in this development, the diameter of the so-called brain of the adult becoming less than that of the nerve cord. A small pigment spot near the anterior end of this brain has a light-perceiving function. Pairs of dorsal and ventral nerves arise from the nerve cord segmentally, but do not unite into mixed spinal nerves as they do in higher forms.

The third major exhibit of chordates is the ownership at some stage in the life cycle of paired gill slits, and of these amphioxus has more than his share since the primary ones subdivide, increasing their number as well as complexity of their arrangement. Capillary vessels in the gill bars are brought very close to water in the atrium, absorbing oxygen and giving off carbon dioxide. The circulatory system is diagrammatically simple and the blood is always confined within a closed sequence of vessels and not, as in arthropods, spilled out into tissue spaces. There are no pigmented corpuscles, and although the ventral aorta running under the gill region pulsates so as to propel the blood, it is not enlarged into a heart.

The atrium is a confusing structure until one understands its development. Then it is seen to form from a pair of metapleural folds that arise near the midventral line and coalesce so as to cut off a small area of outside space, which expands to surround the pharynx at sides and bottom. The sole opening is the atriopore, ahead of the anus. The true body cavity or coelom is crowded dorsally by growth of the atrium and is represented by small dorsal coeloms at top and sides of the pharynx, by a canal under the endostyle, canals in the gill bars, and the gonad sacs.

Excretion is performed by microscopic nephridia, tubes such as found in earthworms and other invertebrates, and unlike the kidney structure of vertebrates. The reproductive organs or gonads are simple sacs, without ducts, and the sexes are separate.

The digestive system offers some points of great interest, correlated with the type of food and the manner in which it is obtained. Amphioxus spends the daylight hours burrowed in the sand of warm and shallow waters near the coastline, with only the anterior end protruding. This end is provided with an oral hood, funnel-shaped to direct the food stream into the mouth, which is no more than an opening in the velum, a muscular partition that, like a diaphragm, opens and closes to regulate the amount of water taken in. On the margins of the hood are a number of buccal cirri, finger-like sense organs, possibly concerned with taste.

The food consists of microscopic plants and animals of the plankton, a "sea soup" that amphioxus proceeds to suck in by ciliary action and then concentrates by straining and entanglement. Excess water passes out through the gill slits of the pharynx and thence through the atriopore, while food particles are entrapped by the endostyle. This is a ciliated groove lined with gland cells that secrete a sticky mucus in the form of a continuous, twisted rope, propelled forward by the cilia, passing around on each side behind the mouth and uniting again to flow steadily backward in a corresponding dorsal trough, the hyperbranchial groove, ending at the intestine.

The pharynx is that part of the alimentary tract fitted with gill bars and slits. It narrows to become the intestine, which continues to decrease in diameter until its exit at the anus. There is no enlargement into a stomach. Arising from the ventral surface of the intestine and projecting forward on the left side is the pouch-like liver.

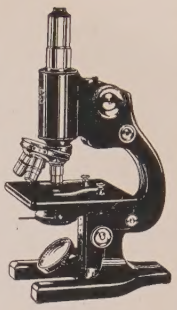
Being soft, unprotected and an easy prey for fishes, amphioxus has adopted a sedentary mode of life, burrowing for protection during the day and wandering forth only at night. This has necessitated a ciliary food-gathering apparatus, coupled with a food-concentrating mechanism, the development of the atrium as a protection for the flimsy wall of the pharynx, which could not function in an animal buried in sand, and the degeneration of brain and sense organs.

Amphioxus has no head, no cranium or brain-case, no jaws, eyes or heart. While it has gone off into a modern side line of burrowing, with certain attendant changes enumerated above, zoologists generally hold that the lancelet represents most closely of all living creatures the original type of vertebrate animal.

A notochord appears at a very early stage in embryos of all higher species, including man, and serves as a basis around which the segmented vertebrae develop. All higher animals have a dorsal, tubular nerve cord, and, at some stage of life, paired gill slits, a postanal tail, an internal skeleton of living tissues, a closed blood system with a ventral heart, a true liver and many other distinctive features shown or foreshadowed by amphioxus.

In the human embryo of the first month the notochord is prominent, gill slits and an external tail are conspicuous and the muscles are arranged in paired blocks—the myotomes. When these structures are lost or modified later on, they leave anatomical footprints on the sands of life—vestigial organs whose only explanation traces back to such remote ancestors as amphioxus, in which they were fully functional. Even in adult man there are traces of the notochord between successive vertebrae, parathyroid glands marking the site of former gill pouches, thyroid derived from the ancient endostyle, a number of

It's a SPENCER!



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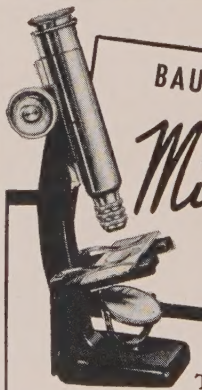

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muscles still primitively segmented, and a reduced, internal tail, even equipped with reduced and useless tail muscles. To quote again from Philip Pope's parody on *Tipperary,* this time from the end of the chorus:

"It's a long, long way from amphioxus,
"But we came from there."

Now how does one secure these fascinating pre-fishes for study or slide making? They are to be found along the coasts of North Carolina and California, the West Indies and Peru, Hawaii and the Philippines, China and Japan, Australia, the Indian Ocean and in the Bay of Naples. In spite of their small size they have been used as a source of food since early times and may be bought on the market in several regions today. Professor Light recounts that Chinese fishermen near Amoy obtain more than a ton per day during the season. Most of us, however, probably have no acquaintances among the members of this unique fishing fleet, and will have to buy our lancelets from a biological supply house.

The *Stazione Zoologica* at Naples, Italy, has long been famous as a source for every stage in the life cycle of amphioxus—eggs, embryos, larvae and adults, while all important American supply houses carry preserved specimens and prepared microscope slides. You may procure finished whole mounts and sections similar to those here illustrated, but we are chiefly interested in recommending at this time that you buy a dozen preserved lancelets and make your own slides. In ordering for whole mounts, specify immature individuals suitable for such purposes; for sectioning, mature animals with gonads. Ask for material fixed in Bouin's fluid or other suitable solution used in microtechnique.

Many staining combinations for whole mounts are favored by different preparators; try several and see which you like best. Acid fuchsin, 1% solution in distilled water, makes a brilliant and beautiful primary stain, to be followed after washing and dehydration by either Lyons blue or fast green FCF, 1% solution in 95% alcohol. Van Giesen's picro-fuchsin is splendid. This consists of one part 1% aqueous solution acid fuchsin to nine parts saturated aqueous solution picric acid. Add a small pinch of the picric acid crystals to each of the dehydrating alcohols and the clearer in order to avoid extracting too much of the yellow color imparted by this reagent.

Delafield's hematoxylin, with or without a counterstain, is excellent, as usual, and the same may be said for borax carmine or alum cochineal. Mallory's Triple Stain will yield superior results if properly handled, but is tricky and several failures must be expected before a satisfactory preparation is obtained.

Sectioning may be done with a hand microtome, but much better results are possible if a machine microtome can be used. Of the various methods celloidin is considerably the best, but others will yield good slides. Cross sections through the buccal (oral) region, anterior pharynx, posterior pharynx (including liver and gonads), intestine (between atriopore and anus) and tail (behind anus) are standard. The several regions may be mounted on separate slides, as usual, or one section of each region mounted in sequence on a single slide, making a composite mount that is highly useful and instructive. Median sagittal (longitudinal and vertical) sections of small specimens are also very much worth while.

Stain sections as you please, including any of the stains or combinations already listed. Either hematoxylin or borax carmine alone are very good, but the double stains are better and Mallory's Triple best of all.

Trade Notes

Readers whose interests touch on the subject will be familiar with a work, *Identification of the Commercial Timbers of the United States,* by H. P. Brown and A. J. Panshin, a highly useful publication now out of print. There will accordingly be a place made on many a book shelf for an entirely new book by the same authors, *Commercial Timbers of the United States.* This is a first edition of a new work, not merely a revision. The two keys are retained and augmented; one is based on characters visible with the naked eye and with a 10X hand lens; the other on minute features requiring a compound microscope.

There are ten chapters preceding the keys, covering the story of wood in dynamic and interesting fashion; woody plants and their cells; the minute structure of coniferous woods and of porous woods; figures in wood; defects and many other topics. In the main key each species is fully discussed as to general characteristics and properties, minute anatomy, remarks, uses and references. There is an excellent glossary. Pp. 554, figs. 312. McGraw-Hill Book Co., Inc., 330 W. 42d St., New York City. $5.00.

Microfans evidenced their appreciation of our recent offer of the Hartman-Leddon catalog by sending in many requests. This company has now furnished us with a supply of their unique Color Chart for the Harleco Universal Indicator, a preparation that produces in proper sequence the colors of the prismatic solar spectrum in direct relation to acidity or alkalinity as expressed by pH numbers. Not only will the indicator show the approximate pH of a sample, but will also disclose the probable type of compound responsible for the effect shown.

The chart is reproduced in full color, with an extension showing a selection of indicators with restricted ranges. Covered with cellophane, the chart may be kept clean merely by wiping with a damp cloth. It is priced at 25c per copy, but you may obtain one by sending only a 3c stamp to Julian D. Corrington, Nature Magazine, 1214 Sixteenth St., N.W., Washington, D. C., and asking for the Harleco Chart.

From the pens of many specialists comes a monumental new work, *Protozoa in Biological Research,* edited by Gary N. Calkins and Francis M. Summers. This large volume of 1148 pages is not intended in any way as a textbook, but has been prepared to stimulate further research on these microorganisms. Each of the twenty chapters deals with some definite phase of work on protozoans and is written by the outstanding authority in that field. The chapters are: general considerations, physical properties of protoplasm, cytoplasmic inclusions, fibrillar systems, motor response, respiration, contractile vacuole, culturing, feeding, growth, life cycles, fertilization, endomixis, sexuality, inheritance, morphogenesis, pathogenicity, immunology, relations to other animals and organisms living on or in protozoa. There are 21 tables, 4 plates and 226 figs. Naturally this is a must book for advanced students of the group. Columbia University Press, Morningside Heights, New York City. $10.00.

A.S.A.M.

Latest addition to the family of Chapters of the Society is the Pittsburgh Chapter, founded through the efforts of the Rev. J. Fredrik Virgin, 3306 Fifth Avenue. Nine members attended the organization meeting and elected Harold L. Servey president, Rev. Virgin vice-president, and Paul Stiteler secretary-treasurer. Meetings are to be held on the first Friday of the month for ten months in the year, at 8 P.M. Already new members have joined and the Chapter has issued its own Bulletin, has attractive stationery, has held several excellent meetings and otherwise gives promise of making rapid progress. Any interested readers living in the Pittsburgh area who wish to join or secure further details should contact the secretary at 3054 Pinehurst Ave., South Hills Branch, Pittsburgh.

Returns from the recent postal voting have been satisfactory so far as to number participating, 303 out of some 800 having taken the trouble to write out, stamp and mail their cards to date. Sentiment is overwhelmingly in favor of increased dues to permit more frequent issues of the *Bulletin,* the proposition of fifty cents annual dues for members under 18 years and one dollar for those 18 and over having carried by a heavy majority. Accordingly such increase herewith becomes official.

Many refrained from voting on the question of pins, rings, stationery and the like while among those who did the opinion was about equally divided. Those in opposition were emphatic in stating that such paraphernalia were unnecessary, out of place, juvenile, would serve no useful purpose, or that we were not yet ready to make such adoptions. If silence in this case means indifference or possibly disapproval, then all such propositions lost by a substantial margin. However, these questions will remain open at present as votes continue to arrive. Items that certainly lost were those of classifying members, awarding merit badges, issuing membership cards and portraits of scientists.

Bulletin No. 5, now being prepared for publication, will feature a splendid article by Benton A. Wheeler, Little Rock, Arkansas, on motion picture photomicrography, with careful illustrations for the manufacture of an observation eyepiece; Donald A. Payne, Orlando, Florida, writes on pollen grains and the Rev. Paul E. Kuehne, Muenster, Sask., tells how to make your own mechanical stage. There are many shorter articles and interesting items.

We have received our first increment for a slide collection. Herman C. Moennich, Little Neck, N. Y., has sent us 15 mushroom spore slides. With these as a nucleus doubtless others will be stimulated to donating specimens toward a national collection that may some day prove of decided value and importance. Anyone so disposed should mail slides to the Secretary at his Chestertown, Md., address.